SOLID WASTE MANAGEMENT STUDY

FOR

MACON COUNTY, NORTH CAROLINA

Solid Waste Management Study
for
Macon County, North Carolina

Prepared for: Macon County Board of Commissioners
County Manager
Solid Waste Department
and The People of Macon County

Technical Assistance
Provided by: North Carolina Department of Natural Resources and Community Development

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PREFACE

This study is organized into several distinct segments. Chapter One provides an introduction to the issues being addressed, states the purposes of the study, and limits its scope. Chapter Two describes the population and economy of the County; this information provides a basic reference for subsequent chapters. Chapter Three, which is the most extensive segment of the report, deals with the County's existing solid waste management system and furnishes the foundation for the study. Chapter Three contains inventories as well as analyses of current conditions. Based upon the information presented in Chapter Three, Chapter Four identifies the various problems which confront the County's solid waste management system along with recommendations and/or alternatives which should be pursued in addressing these problems. Alternatives (as opposed to brief recommendations) have been developed in those cases where a clear cut solution to a problem does not exist and more detailed information (such as cost comparisons) are needed in order for the County to select an appropriate course of action. Finally, Chapter Five is directed toward the implementation of recommendations and alternatives. The Appendix contains information such as the texts of County ordinances and State regulations and will hopefully prove to be a resource for the continuing management of the County's solid waste system.

CHAPTER ONE
INTRODUCTION, PURPOSE AND SCOPE

Macon County, North Carolina currently operates and maintains, through the structure of the county-level government, a solid waste collection and disposal system. The collection system utilizes the green box as the basic unit for gathering solid waste. A green box is relatively small (i.e. 4 to 8 cubic yard capacity) metal container which serves as a solid waste receptacle and which has since the early 1970's gained increased public recognition as a safe and efficient method of collecting solid waste in rural areas. The green box functions primarily as a means of collecting household waste material, however, small businesses, industries, institutions, etc. which do not generate excessively large volumes of solid waste can also be accommodated by the green box system. The green box is perhaps best identified by the trade name "Dumpster" and, when considered as a network, forms a "bulk storage container system".

It should be emphasized that, within the context of this study, the green box will be treated consistently under the general heading of solid waste collection as opposed to disposal. Although this point is perhaps minor, it could conceivably carry a great impact when attempting to deal with complex issues such as cost sharing among local government units (if the need for devising such an arrangement should surface in the future). Based upon prior experiences, a general consensus has arisen that disposal does not occur until solid waste material is received at the ultimate disposal site, which in Macon County's case, consists of burial at a sanitary landfill. The basic component of the County's disposal system is the Central Landfill, which is also operated and maintained by the county-level government.

Macon County instituted its green box system in 1972 along with a comprehensive clearing of 253 open dumps. Since that time, the County has expanded,

improved or otherwise modified the system in an effort to obtain for its citizens a combination of the best possible service at the lowest possible cost. Over the past several years, the system has established itself as an effective method of solid waste collection and serves as an example of a well-operated and -maintained green box system within a rural Southern Appalachian county. Due to the investment which the County has made in its green box system, coupled with the generally positive level of public acceptance which it has enjoyed, the County is committed to continuing this basic mode of operation. Consequently, it shall be the purpose of this study to examine measures which might be taken in order to improve Macon County's existing solid waste structure (both collection and disposal) in terms of: a) reduced costs, b) increased service, or most desirably c) a combination of reduced costs and increased service. Consideration shall be given to the interaction of the County's solid waste management system with those systems operated by other entities within the County (such as municipalities and private haulers) but the study will focus only upon those elements which are the responsibility of the County government.

Specifically, Macon County officials have requested that the study treat the following subject areas:

1) Green box site locations and capacities
2) Collection routing and frequency
3) Personnel
4) Equipment (e.g. rolling stock)
5) Facilities (e.g. landfill)
6) Overall management and operations
7) Possible alternatives to the green box system in certain critical areas of the County

It is possible that certain topics (e.g. scheduling of maintenance for rolling stock) warranting additional, more-detailed research will be identified

as a result of this report. Accordingly, this report should be viewed as a basic management tool and as a foundation for continued upgrading of the County's solid waste system.

A conscious effort will be made throughout this study to eliminate unnecessary content and to orient the study as much as possible toward practical information which can be applied directly to Macon County. This should not be construed to mean that much of the generalized or theoretical information which relates to the field of solid waste management and which has been omitted from this report is not valuable, but that such information is available from other sources and that repitition in this report would not be justified. An abundance of resource materials which may prove to be useful to Macon County is contained in bibliography form in the U. S. Environmental Protection Agency publication Solid Waste Management: Available Information Materials Total Listing 1966-76 (SW-58.26). This publication as well as many others pertaining to the field of solid waste management is available (usually at no charge) from:

Solid Waste Information
U. S. Environmental Protection Agency
Cincinnati, Ohio 45268

It is recommended specifically that the excellent 1976 EPA publication Decision Makers Guide in Solid Waste Management be utilized in conjunction with this report in order for the report to be of maximum benefit to the County.

Table 1
Rural Collection Methods: Pros and Cons

Alternative	Potential Advantages	Potential Disadvantages	Conditions Which Favor Alternative
Disposal by residents on their property	No cost to local government	Difficult to monitor and control Can lead to roadside dumping and open dumping Requires extensive educational campaign to ensure proper disposal	Isolated areas
Hauling by residents to landfills	No cost to local government	Distance to landfill may discourage regular trips Can lead to roadside dumping and open burning Generates excessive traffic at landfill Poses hardship for persons without means of transportation	Landfills are easily accessible
Centrally located bulk containers	Operating costs are relatively low Promiscuous dumping is reduced Public acceptability is high Sites can be located near users	Initial capital cost may be high Vandalism may occur at unattended sites Difficult to assess user fee Poses hardship for persons without transportation If implemented near municipalities containers may be used by town residents to avoid paying for collection service	Roads allow passage of collection vehicles

Table 1 cont.

Alternative	Potential Advantages	Potential Disadvantages	Conditions Which Favor Alternative
Mailbox system	Collects from largest number of people	Residents must remember collection day	Population is fairly concentrated
	User fees can be established	Waste may be spilled at roadside prior to pickup	
		Time consuming and costly in isolated areas	

Source: EPA

CHAPTER TWO

POPULATION AND ECONOMY

POPULATION

In an effort to furnish broad guidelines as to the volumes, frequencies, composition, etc. of solid waste generated within Macon County (particularly by geographic sector and source) certain key indicators of the County's population and economy shall be outlined in this chapter.

Permanent Population

The following table illustrates County population trends since 1940, both within Macon County and for the County relative to the region and State as a whole. As a general rule, most of the Appalachian counties of North Carolina have exhibited a pattern of: a) steady growth from 1900 until about 1940 or 1950, b) population decline from 1940/1950 until about 1960 or 1970, and c) population increase from 1960/1970 until the present, a reversal of the previous trend.

Table 2
Population Summary (1940-1970)

Jurisdiction	1940	1950	1960	1970	% Change 1940-70	1977 est.
Burningtown Twp.	963	783	528	540	-44%	
Cartoogechaye Twp.	1,100	994	973	934	-16%	
Cowee Twp.	1,474	1,403	1,049	983	-34%	
Ellijay Twp.	1,123	1,102	900	967	-14%	
Flats Twp.	349	338	265	247	-30%	
Franklin Twp.	4,835	5,738	6,026	7,166	+48%	
(Town of Franklin	1,249	1,975	2,173	2,336	+89%	2,300)
Highlands Twp.	1,329	1,556	1,418	1,450	+9%	
(Town of Highlands	569	515	597	583	+2%	670)
Millshoal Twp.	956	938	1,031	920	-4%	
Nantahala Twp.	1,403	1,275	893	848	-40%	
Smithbridge Twp.	1,589	1,413	1,283	1,273	-20%	
Sugarfork Twp.	759	634	514	460	-40%	
MACON COUNTY	15,880	16,174	14,935	15,788	-1%	18,300
REGION A	113,863	114,173	109,106	115,024	+1%	127,300
STATE OF NC	3,571,623	4,061,929	4,556,155	5,082,059	+42%	5,525,000

(Source: U.S. Census, N.C. Dept. of Administration and N.C. Dept. of Natural Resources & Community Development)

From Table 2, it is seen that nine of the eleven townships in the County exhibited negative growth rates during the period 1940-1970. Seven of the eleven also maintained negative growth rates during the most recent Census decade of 1960-1970. The Town of Franklin and Franklin Township are by far the most rapidly growing areas of the County according to this information. It will be interesting to compare and contrast the results of the upcoming 1980 Census (exclusive of municipal annexations) with these population trends in order to determine whether these trends will continue or be reversed.

The proportion of the County's total population which was contained in the various sub-county jurisdictions in 1970 is shown in the following table.

Table 3
Macon County: Population by Jurisdiction (1970)

Jurisdiction	% of Total County Population
Burningtown Twp.	3.4
Cartoogechaye Twp.	5.9
Cowee Twp.	6.2
Ellijay Twp.	6.1
Flats Twp.	1.6
Franklin Twp.	45.4
(Town of Franklin	14.8)
Highlands Twp.	9.2
(Town of Highlands	3.7)
Millshoal Twp.	5.8
Nantahala Twp.	5.4
Smithbridge Twp.	8.1
Sugarfork Twp.	2.9

(Source: U.S. Census)

Thus, well over one-half of the County's total population resided in two townships (Franklin and Highlands) in 1970. It should be noted that Macon County is sparsely settled when judged by North Carolina standards...the number of persons per square mile in 1970 was 30.8 for Macon County and 104.1 for the State as a whole.

Table 3a
Macon County: Population Density by Township (1970)

	Area (Sq. Mi.)	Density (Persons per Sq. Mi.)
Burningtown	36.4	14.8
Cartoogechaye	93.5	10.0
Cowee	42.4	23.2
Ellijay	25.8	37.5
Flats	14.3	17.3
Franklin	45.1	158.9
Highlands	56.2	25.8
Millshoal	24.6	37.4
Nantahala	78.8	10.8
Smithbridge	62.3	20.4
Sugar Fork	33.6	13.7
MACON COUNTY	513.0	30.8

(Source: U.S. Census)

Seasonal Population

It is difficult to adequately assess the seasonal population of Macon County since no official counts of this element exist. The County is definitely one of the most active areas in the State in terms of both overnight tourism and second-home development, both of which act to produce a heavy increase in population (and consequently, solid waste generation) during the loosely-defined period covering May through October. Solid waste loads are especially great during late-April and mid-October as seasonal residents move to and from their second homes. Heavy loads also occur during the Fourth of July week as well as the "leaf season" in early October. It has been estimated unofficially that Macon County registers population increases within the range of 80%-140% during the May-October period. A detailed 1979 study of population in the extremely seasonally-oriented Highlands urban area, for example, reveals a permanent to seasonal increase in the range of 200%-250%.

The following table extracted from the U.S. Census (and believed to be somewhat inaccurate) lists the number of seasonal housing units by jurisdiction in 1970 and provides a broad indicator of the seasonal population increase within the various sections of the County.

Table 4
Macon County: Seasonal Housing Units by Jurisdiction (1970)

	Seasonal Units	Total Units	% Of Total
Burningtown Twp.	7	240	2.9
Cartoogechaye Twp.	1	443	0.1
Cowee Twp.	81	445	18.2
Ellijay Twp.	85	428	19.8
Flats Twp.	64	170	37.6
Franklin Twp.	330	2,954	11.1
(Town of Franklin	25	956	2.6)
Highlands Twp.	999	1,610	62.0
(Town of Highlands	277	574	43.2)
Millshoal Twp.	83	423	19.6
Nantahala Twp.	35	348	10.0
Smithbridge Twp.	131	581	22.5
Sugarfork Twp.	132	320	41.2
MACON COUNTY	1,948	7,962	24.4

(Source: U.S. Census)

Therefore, nearly one quarter of all housing units in Macon County in 1970 were seasonally-occupied. It should be emphasized that these figures do not reflect the vast majority of hotel and motel rooms and other forms of short-term accommodations (i.e. some mobile homes) in the County. As a result, the increase in the number of persons living in the County at a given time during the May-October period is probably much greater than this table would indicate.

ECONOMY

Table 5 provides a summary of economic trends in Macon County during the period 1930-1970. As the percentage of the labor force in agriculture has steadily decreased, there has been a corresponding increase in the remaining categories (especially manufacturing, which has multiplied over four fold).

Table 5
Macon County: Percentage Composition of Labor Force (1930-1970)

	Agriculture		Manufacturing		Other	
	Macon	NC	Macon	NC	Macon	NC
1930	65.7	43.8	7.5	22.0	26.8	34.2
1940	53.7	33.6	8.0	26.9	38.3	39.5
1950	43.5	24.6	12.0	28.1	44.6	47.4
1960	15.5	12.8	25.8	31.7	58.7	55.5
1970	8.1	5.2	32.4	35.5	59.5	59.3

(Source: C. Horace Hamilton)

A more detailed breakdown of the labor force in 1970 reveals the following figures. It should be borne in mind that these figures reflect employed persons residing in Macon County and not jobs per se within Macon County. The County exhibited a net daily commuting loss of 532 persons (about 10% of the employed labor force) in 1970.

Table 6
Macon County: Employment by Industry (1970)

	Macon Co.	(%)	NC %
Agriculture, forestry, fishing, mining	484	(8.7)	5.5
Construction	726	(13.1)	6.7
Manufacturing	1,794	(32.4)	35.5
Transportation, communication, utilities, sanitation	321	(5.8)	5.5
Wholesale and retail trade	740	(13.4)	17.5
Banking, insurance, real estate, business, repair	229	(4.1)	5.6
Other services	406	(7.3)	6.0

In order to better assess the composition of the County's stream of solid waste materials, the accompanying table listing major industries and their products should be examined:

Table 7
Macon County: Industries and Their Products (1979)

Name	Products	Employment Range
Ashland Warren, Inc.	Crushed rock Crushed stone Metal culvert pipe	10-19
B & B Lumber Company, Inc.	Lumber hardwood Pulp chips Logs	10-19
Belden Corp.	Electrical cords Jute yarn Terminals Paperboard cartons Polyvinylchloride	250-499
Blue Bell, Inc.	Boxer jeans	100-249
C. R. Industries	Mechanical oil seals	100-249
Community Newspapers, Inc.	Weekly newspaper Paper supplies & printing	10-19
Cook Brothers Lumber Company, Inc.	Lumber hardwood Lumber softwood Timber	10-19
Franklin Frozen Foods, Inc.	Fresh meat products Cured pork products Beef Pork	5-9
Franklin Mineral Products	Wet ground mica Scrap mica	20-49
Macon Transit Concrete Company	Ready mix concrete Cement Stone Sand	5-9
Owenby Manufacturing Company	Draperies lined Thread Buckram	50-99
Progressive Building Products, Inc.	Plywood roof clips Soffett vents Post bottom & caps Aluminum columns Aluminum extrusions Aluminum rolled stock Aluminum castings	50-99
E. S. Purdom & Company	Custom made furniture Lumber	5-9
Rocky Mount Undergarment Company	Ladies undergarments	50-99
Zickgraf Hardwood Company	Hardwood flooring Furniture & pallet lumber Rough hardwood lumber	50-99

(Source: N. C. Department of Commerce)

The impact of the May to October season upon the County's economy can perhaps best be illustrated by observing Table 8.

Table 8
Macon County: Gross Retail Sales (1975-1978)

Month	1975	1976	1977	1978
January	$ -	$4511234	$5313327	$5917273
February	-	3374557	3977864	3904680
March	-	3503858	3679871	4630753
April	-	4382356	4807758	4326883
May	-	5000832	5302038	5516483
June	-	5501338	6053871	9566360
July	-	6208045	6517925	9499216
August	-	7369521	8408906	8468184
September	-	7389406	8408443	8718109
October	5170822	6490126	6880618	-
November	5385365	6622448	7355960	-
December	4205287	5003028	5411968	-

(Source: N. C. Department of Revenue)

The above figures possess a one-month lag, such that figures reported for August, for example, actually describe July sales. Using this framework, it is seen that during the 12-month period ending August 31, 1978, the months of May, June, July and August accounted for over 45% of total annual retail sales.

CHAPTER THREE

EXISTING SYSTEM

INSTITUTIONAL FRAMEWORK

There exist five major entities or groups which have assumed responsibilities for the collection and/or disposal of solid waste in Macon County:

1) Macon County (i.e. the county-level government)
2) Town of Franklin
3) Town of Highlands
4) Private commercial solid waste haulers
5) Industries, businesses, and citizens who collect and/or dispose solid waste independently of any of the previous methods

Each of these five categories shall now be examined separately.

Macon County

Macon County became involved extensively in solid waste collection and disposal in the early 1970's. During that period, the County began operation of the Central Landfill and initiated the green box collection system. The Central Landfill (p. 25) had previously been owned and operated by the Town of Franklin. This landfill remains under the ownership of Franklin, while the County provides the equipment and manpower necessary to operate and maintain this facility. Although the Central Landfill receives its heaviest use from the County's green box system combined with the Town of Franklin's municipal collection system, it is available for use at no fee to all parties within Macon County. Similarly, the County's green box system, although available for use also at no fee to all parties within Macon County, is intended primarily as a means of collecting solid waste from otherwise unserved sections of the County, such as unincorporated territories. These policies are consistent with North Carolina General Statute 153A-292 which states that "no

county shall be authorized...to levy a disposal fee upon any municipality located in that county if the Board of Commissioners levy a countywide tax on property which provides in part for financing such disposal facilities." In summary, then, the county government operates both collection and disposal facilities available to all parties within the County. These facilities receive heavier use by certain sectors of the County (i.e. the Central Landfill by the Town of Franklin and County green box system; the green box system by the unincorporated territories) due to the manner in which the comprehensive, Countywide solid waste management system has evolved.

Town of Franklin

The Town of Franklin (est. pop. 2800), located near the center of the County, is the largest of Macon County's two municipalities and serves as the seat of County government. The Town of Franklin operates a house-to-house municipal solid waste collection service within its corporate limits; disposal takes place at the Central Landfill. Several of the County's green boxes are situated either within or near the Town's corporate limits and in all probability receive occasional loads of solid waste generated by parties within the Town of Franklin. The great majority of solid waste generated by the Town is, however, gathered via the municipal collection system and is therefore handled independently of the County's green box network.

Town of Highlands

The Town of Highlands (est. pop. 670), is located in the southeastern corner of the County, and is perhaps best characterized as a small resort community subject to a steep rise in population during the May-October season. The Town operates a house-to-house municipal collection system which, pursuant to a municipal ordinance, is mandatory and is financed through user fees. As is the case in Franklin, several of the County's green boxes are situated either

within or near Highland's corporate limits and as a consequence, probably receive occasional loads of solid waste generated by parties within the Town of Highlands. The great majority of the Town of Highlands' solid waste is, however, handled independently of the County's green box system.

Due in part to the relatively isolated location of the Town of Highlands, time, expense and convenience make it prohibitive to shuttle Highlands' municipal collection vehicles to and from the Central (County) Landfill. In order to remedy this situation, the Town of Highlands operates and maintains its own landfill (p. 28). The Highlands Landfill is subsidized and utilized by the remainder of Macon County and is therefore considered a component of the County's solid waste management system.

Within the context of this study, the Town of Highlands and its environs are especially critical for several major reasons:

1) Effective July 1, 1980, the land area encompassed by the Town will expand to roughly two and one-half times its former size due to an annexation of adjacent urban areas. Compounding this situation is the fact that this annexation has been contested, litigation is pending as of this writing, and it is uncertain as to whether the courts will resolve this issue prior to July 1, 1980. The final outcome of this issue will be a major factor in determining the level of County green box service required to accommodate the Highlands area.
2) The drastic fluctuations in solid waste volumes generated in the Highlands area (which result from seasonal influences) place a heavy burden upon the County's green box system and produce instability in collection scheduling and routing.
3) The rugged topographical conditions which are encountered by collection vehicles in the Highlands area produce safety hazards

as well as severe wear and tear on equipment.

4) The concept of a County green box system has been accepted and endorsed by most parties within the Highlands area. Strong resistance is often met, however, once the green boxes are actually sited and placed into operation. The seemingly constant shuffling of green box sites in the Highlands area in response to this resistance has produced instablity in site locations and capacities. Due to an overall shortage of acceptable sites, and limited alternatives to the green box system, this situation poses a serious threat to the viability of a County-operated and -maintained solid waste collection service in the Highlands area.

Private Commercial Haulers

Pursuant to the authority granted under G.S. 153A-136, Macon County authorizes franchises and regulates the fees and activities of private persons, firms and corporations which collect solid waste in Macon County. There exists currently only one private commercial solid waste collector in the County operating under an official County-authorized franchise. The geographic limits, permissible fees and responsibilities of this franchisee are set forth in a County resolution dated February 6, 1978 (see Appendices). It is believed that additional private collectors exist within the County, most of whom service subdivisions and second-home developments, but none of whom operate under a County franchise.

Industries, Businesses, Citizens Collecting/Disposing Independently

Several individual parties within the County transport solid waste directly to a disposal site independently of the box system, municipal systems, or private haulers. The disposal site is normally either the Central or Highlands

Landfill, however, it is not uncommon for parties (especially in remote areas or large tracts of land such as on farms) to maintain small-scale private landfills or other means of sanitary disposal of solid waste material. Unfortunately, solid waste material is also often deposited indiscriminately along roadsides or creek banks.

[From this point forward, the study will devote attention only to the Macon County (i.e. county-level) solid waste management system.]

Administration

The responsibility for solid waste management in Macon County is vested within the County's Solid Waste Department. Personnel within the Department report to the Solid Waste Supervisor, who in turn reports to the County Manager. The County Manager serves as the chief administrative officer of the Macon County Board of Commissioners, a five member elected body which serves as the ultimate governing and policy-making authority in the County.

An organization chart outlining the various lines of responsibility for the Solid Waste Department is found in Table 16.

Local Ordinances, Etc.

Pursuant to the various levels of authority granted under North Carolina enabling legislation, Macon County has adopted various local ordinance(s), resolution(s), and interlocal agreement(s). The full texts of these documents are found in the Appendices to this report. Briefly, these are a(n):

1) Agreement between the Town of Franklin and Macon County designating the Town as owner and the County as operator of the Central Landfill (5/10/73);
2) Ordinance regulating the use of the County's solid waste collection facilities (9/12/77);
3) Resolution granting an exclusive franchise to a private commercial solid waste collector (2/6/78);
4) An amendment which makes certain revisions to the fee structure set forth for the private hauler in the February 6, 1978 resolution (3/5/79).

MAJOR EQUIPMENT AND FACILITIES

Major Equipment

In order to service the County's green boxes, conduct work at the Central Landfill and perform related duties such as site maintenance, the following rolling stock is owned by the County:

Table 9
Solid Waste Rolling Stock (May 31, 1979)

Description	Year	Road Mileage	Original Cost	Condition
White compactor truck	1978	13,640[1]	$65,000	Excellent
Mack compactor truck	1976	68,279[1]	65,000	Good
GMC compactor truck	1974	141,200[1]	53,000	Poor
Dump truck	1969	144,932	900	Fair
1/2 ton pick-up truck	1970	82,110	600	Fair
Cat 955 front-end loader	1973	-	36,000	Fair[2]

[1] Road mileage x 1.5 = motor miles (accounts for time vehicle is operational but stationary)

[2] Has since been rebuilt

The three compactor trucks listed above are front-loading vehicles with capacities of ±32 cubic yards and compaction ratios of about 3:1, that is, three typical cubic yards of loose solid waste material can be compressed into one. These vehicles are capable of servicing various types and sizes of green boxes. As a rule, only two of these three collection vehicles are in operation at any given time; the third (normally the GMC) is retained as a back-up vehicle. The dump truck and pick-up truck are used for green box site maintenance and clean-up as well as miscellaneous duties such as running errands or transporting relatively small equipment. The front-end loader, which performs the duties of earthmoving and waste disposal at the landfill,

Table 10
Characteristics of Rural Bulk Bin Collection Systems by Type of Vehicle Used

Item	Vehicle Type		
	Front-loading	Rear-loading	Side-loading
Crew size	1 driver-collector	1 driver, 1 to 3 collectors	1 driver, 1 or 2 collectors
Typical container servicing time	1 to 2 min.	2 to 6 min. (includes some litter cleanup)	1 to 3 min. (includes some litter cleanup)
Container site development	Requires pull-off area from main road, with gravel or paved surface common	Requires area in which to back up to container; gravel or paved surface is common	If users and collection vehicle can stop safely along road, site needs to be only slightly larger than containers; otherwise pull-off area is common with gravel or paved surface
Container sizes	0.8 to 8 cu m (1 to 10 cu yd)	0.8 to 4.5 cu m (1 to 6 cu yd)	0.8 to 3.1 cu m (1 to 4 cu yd)
Site maintenance	Usually a special crew cleans site periodically	Collection crew cleans up as containers are emptied	Collection crew cleans up as containers are emptied
Typical packer body sizes	15.3 to 30.2 cu m (20 to 40 cu yd)	12 to 22.7 cu m (16 to 30 cu yd)	9.9 to 24.5 cu m (13 to 32 cu yd)
Types of wastes collected	Any wastes that will fit inside container	Any wastes that will fit into rear-loading hopper	Any waste that can be placed through side doors
Vehicle flexibility	Can service only front-loading containers	Can service both rear-loading containers and house-to-house collection	Can service both side-loading containers and house-to house collection

Source: EPA

is the only piece of heavy equipment stationed at the Central Landfill.

Fundamental maintenance of rolling stock as well as the green boxes themselves is to the maximum extent possible performed either in-house or at local private service facilities. More involved repairs/maintenance often necessitates transporting the equipment to distant service facilities (e.g. Asheville) at considerable expense to the County. This mode of operation will be modified somewhat if the in-house maintenance facility now being planned by the County is indeed constructed (p. 48).

As of November, 1979, Macon County owned 158 green boxes, the average individual lifespan of which is estimated by local officials of roughly six years. The lifespan of an average collection vehicle of the type operated by Macon County is, according to national figures, about five years. One national guideline suggests that the chassis should be replaced every three to four years and bodies every six to eight years. Factors such as terrain and accrued hours of operation may, however, have a substantial impact upon the useful life of such a vehicle. The mountainous topography of Macon County (typified by the extremely steep grade along NC 106 leading into Georgia near Scaly Mountain) places an extraordinary strain on the County's collection vehicles...brake systems, for example, are very short lived by most standards.

Major Facilities

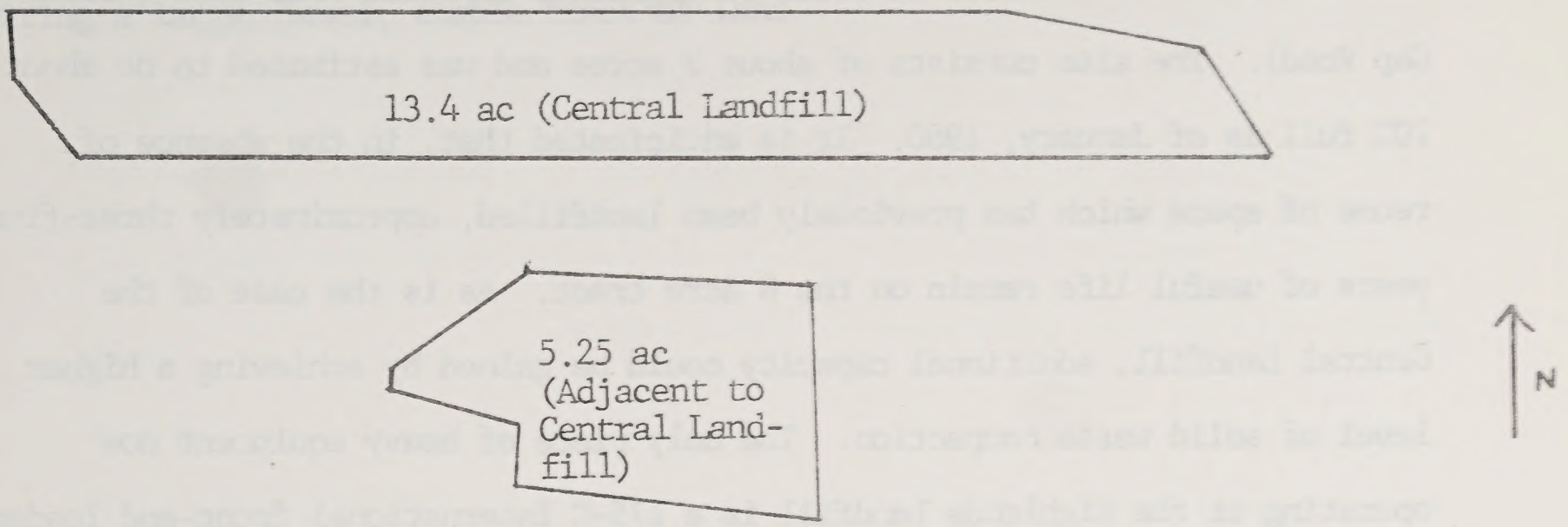
There exist two public landfills within Macon County: 1) the Central (County) Landfill and 2) the Highlands Landfill.

As outlined previously, the Central Landfill is owned by the Town of Franklin and operated/maintained by Macon County. The Central Landfill is located between State Road 1325 (Lake Emory Road) and U.S. 23-441 northwest of Franklin. This facility was used initially as an open dump by the Town of Franklin (c. 1965-1972) and was converted to a sanitary landfill when the County assumed operations in 1973. The Central Landfill is operated in

accordance with all applicable State rules and regulations (Appendices) and is open to the public five full days (Monday-Friday) and one-half day (Saturday morning) per week. The landfill opens at about 8 a.m. Monday-Saturday; the closing time hinges upon the exit of the last County green box collection vehicle of the day. This arrangement has resulted normally in longer hours of operation during the May-October period due to the significantly larger collection routes experienced during that season. The landfill is not operated on Sundays due in part to its proximity to a church.

The site owned by the Town of Franklin upon which the Central Landfill is located consists of 13.4 acres, all of which have not been used to date for the purpose of solid waste landfilling. It is (unofficially) estimated that within this 13.4 acre site, sufficient capacity remains to accommodate an additional five years of solid waste assuming that current inflow holds relatively constant along with a growth factor over this period. Additional life could be extracted from the site if a higher degree of compaction, such as that provided by a landfill compactor, could be achieved. The County does not presently possess this capacity. In view of the fact that the County owns a tract adjacent to these 13.4 acres consisting of 5.25 acres which could be combined with the present site, and that the possibility further exists for linking this combined tract with a nearby 18.63 acre tract under County ownership (Map 1), the prospect of retaining for many years an adequate disposal site within the general vicinity of the Central Landfill appears to be quite favorable. It is of critical importance that the location(s) of disposal site(s) be projected for a considerable time in advance of actual use so that the other elements of the comprehensive solid waste system which are influenced to a great degree by the location of the disposal site (i.e. collection routing, scheduling and especially facilities such as transfer stations) can be planned to complement the disposal site and thereby produce optimal benefits for the County.

Map 1
Central Landfill and Accompanying Sites



Scale 1" = 400'

NOTE: This page merely shows each individual tract and is not intended to accurately depict the spatial relationships among the tracts.

The Highlands Landfill is situated on a tract of land owned by the U.S. Forest Service and is operated by the Town of Highlands. This facility, which was also utilized for a time as an open dump, was initiated in 1968 and is located off of N.C. 28 south of Highlands on State Road 1610 (Wilson Gap Road). The site consists of about 8 acres and was estimated to be about 70% full as of January, 1980. It is anticipated that, in the absence of reuse of space which has previously been landfilled, approximately three-five years of useful life remain on the 8 acre tract. As is the case of the Central Landfill, additional capacity could be gained by achieving a higher level of solid waste compaction. The only piece of heavy equipment now operating at the Highlands Landfill is a 175-C International front-end loader.

Pursuant to a verbal agreement which exists between the Town of Highlands and Macon County, the County subsidizes a portion of the operating and maintenance costs of the Highlands Landfill via an annual payment to the Town. This subsidy enables the County's green box collection vehicles to unload into the Highlands Landfill. This arrangement is especially convenient whenever a County collection vehicle attains a full load and is relatively near the Highlands Landfill. Due in part to the County subsidy, the landfill is not restricted to use only by parties within the Town of Highlands, rather, it is available to the entire County.

During the in-season, the Highlands Landfill is open from 8 a.m.-4 p.m. Monday through Friday and 8 a.m. to Noon on Saturday. During the off-season it is open only 8 a.m.- 4 p.m. Monday, Wednesday and Friday. An effort is made by the Town to limit the materials deposited into the landfill to residential and light commercial waste.

It is believed that neither the Central nor Highlands Landfills have been comprehensively planned, designed or engineered. These measures are

important not only because they improve the service provided by the landfills, but because when filled to capacity, a well-planned landfill may possess a substantial value as a site for industry, recreation or other activities requiring a large, level, stable tract of land.

THE GREEN BOX SYSTEM

Ownership

With few exceptions, the land parcels now being utilized as green box sites are owned either by the North Carolina Department of Transportation or the Macon County Board of Education. Most of those owned by the latter exist primarily to serve schools, although one is oriented toward use by the general public as well. A very few of the sites are owned either by private individuals, businesses or institutions.

Location

The location of the green box sites, when viewed from a Countywide perspective, is based upon a rough design which has sought to maximize service and minimize costs. It would perhaps be more accurate to say that the locations have evolved through a process of following the "path of least resistance". In a number of instances, for example, citizen opposition has resulted in removal of the boxes. Conversely, the demands of the public have sometimes resulted in the establishment of sites which otherwise could not have been justified. As a general rule, it appears that the network of site locations has achieved a state of equilibrium and public acceptance, and in the absence of a comprehensively planned system, is providing an efficient level of service. Convenient access to a green box site is available in virtually all populated sectors of the County. An often-used guideline states that the maximum distance of a container from any user should not exceed three to five miles and that the ideal distance is one to two miles.

Map 2 shows the locations of the various green box sites in Macon County.

Capacity

Two basic green box units are employed by Macon County: a) 4 cubic yard boxes and b) 6 cubic yard boxes. Several variations of these basic units

can be found, as exhibited by a diverse assortment of shapes and slight differences in capacity. For the purposes of this study, each box will be treated as either a 4 or 6 c.y. capacity unit.

As of November, 1979, the green box system was comprised of 158 units.

Table 11
Site Capacity Summary (1979)

	Route 1/SE	Route 2/NW	Total
Total Boxes	81	77	158
4 c.y.	60	53	113
6 c.y.	21	24	45
Total Site Capacity	366 c.y.	356 c.y.	722 c.y.

Therefore, the system possessed on aggregate site capacity of 722 cubic yards, balanced nearly evenly between Routes 1 and 2. (The routing system is explained on pp. 34-35.) Table 12, which is keyed to the site locations found on Map 2, provides a detailed listing of containers and site capacities at each individual site. In planning the site capacity of each individual site, factors such as population served, rates and types of waste generated, frequency of collection, anticipated peak loads and availabiltiy of land should theoretically be taken into account.

Table 12
Site Capacity (1979)

Route 1/Mack/South and East

Map Key	Site Name	Total Boxes	4 cy	6 cy	Site Capacity
1	Mountain View Exxon	7	5	2	32 cy
2	Cullasaja School	1	1		4
3	Little Ellijay	4	4		16
4	Walnut Creek	4	3	1	18
5	Goldmine Road	2	2		8
6	Flat Mountain	10	7	3	46
7	Highlands School	2	1	1	10
8	Route 28	4	4		16
9	Village Apartments	1	1		4
10	Scaly Mountain	4	4		16
11	Country Store	4		4	24
12	Otto Exxon	3	1	2	16
13	Otto School	1	1		4
14	Riverside	3	2	1	14
15	Morrison Community	4	3	1	18
16	Union School	4	4		16
17	Community Fair Bldg.	8	5	3	38
18	Community Facility Bldg.	1	1		4
19	Recreation Park	1	1		4
20	Mashburn Branch	5	4	1	22
21	Middle Grade School	1	1		4
22	Flea Market	2	1	1	10
23	Holly Springs #1	3	2	1	14
24	Holly Springs Community Bldg.	2	2		8

Route 2/White/North and West

Map Key	Site Name	Total Boxes	4 cy	6 cy	Site Capacity
25	Education Building	4	3	1	18 cy
26	Patton Springs	1	1		4
27	Race Track	1	1		4
28	Double Churches	5	4	1	22
29	Cartoogechaye School	1	1		4
30	Jones Creek	2	2		8
31	Allison Creek	2	2		8
32	Rainbow Springs	4	4		16
33	Co-op	2	2		8
34	Double Branches	8		8	48
35	Airport	1	1		4
36	Moody Farm	3	3		12
37	Iotla School	1		1	6
38	Oak Grove Church	3	2	1	14
39	Snow Hill	2	1	1	10
40	Ruby Mine #1	3	2	1	14
41	Ruby Mine #2	2	2		8
42	Cowee School	1	1		4
43	Holden's	1	1		4
44	Iotla Bridge	2		2	12
45	Sanders Town	2		2	12
46	City Restaurant	6	1	5	34
47	East Franklin School	1	1		4
48	Franklin High School	2	1	1	10
49	Nantahala #1	2	2		8
50	Fiesty Branch	3	3		12
51	Quarry	2	2		8
52	Nantahala High School	2	2		8
53	Below N.H.S.	5	5		20
54	Highway 19	3	3		12

Collection Routing and Frequency

A number of factors have acted to determine the routing and frequency of green box collection in Macon County. In order to achieve maximum efficiency, for example, it is desirable to follow practices such as: a) providing site capacity sufficient to reduce the collection frequency to a manageable level, b) eliminating backtracking and other unproductive travel from the collection routes, c) routing collection vehicles so that they will be reasonably near a disposal site when the vehicle has reached capacity, d) when a route or leg of a route must be backtracked, initiating the route at the point most distant from the landfill and working back toward the landfill, thereby minimizing the distance the vehicle must travel while under a heavy load. A route which forms a circuit is perhaps ideal. Factors such as steep grades and narrow or light-duty bridges must also be considered in devising collection routes.

Collection routing and frequency has become somewhat standardized in Macon County, but varies occasionally in response to demand, convenience and other factors. The seasonal economy of the area has necessitated more frequent collection during the May-October period. Most of the green boxes in the Highlands area, for example, are serviced six to seven days per week during the in-season but only three times per week the remainder of the year.

Macon County's collection system is structured around two basic routes. Route 1 encompasses the southern and eastern sections of the County while Route 2 serves the northern and western sections. Both Routes 1 and 2 are equipped with one collection vehicle and one driver each. The Mack truck customarily serves Route 1 and the White truck Route 2, even though this arrangement is flexible and is determined largely by vehicle conditions. Within each of these two basic routes, a specific collection schedule is operated depending upon the day of the week. Thus, Route 1 will always fall within the southern/eastern section of the County, but the specific stops within that route will differ from day to day.

While the two basic routes are easy to conceptualize, the daily collection schedules become somewhat complicated. Table 13 resolves this problem by providing a detailed explanation of routing and frequency. In this table, if a numeral appears under a day of the week column, it indicates that the particular site is collected on that day (i.e. frequency). The numeral itself refers to the sequence in which the site is collected (i.e. routing). Examples: a) Mountain View Exxon is on Route 1, is collected seven times per week, and is the first stop every day, b) Otto School is on Route 1, is collected five times per week, and is the sixth stop on Monday, thirteenth stop Tuesday, sixth stop Wednesday, etc., c) Rainbow Springs is on Route 2, is collected only once weekly, and is the eighth stop on Monday. The specific site location is signified by the map key, which refers to Map 2. Both collection vehicles are dispatched and return to a specific point, the Shell Service Center on U.S. 23-441 south of Franklin, each day. It should be emphasized that Table 13 reflects only the off-season period...a modified version of this system which employs more frequent collection and altered routing is invoked during the in-season.

Table 13
Collection Routing and Frequency: November-April (1979)

Route 1/Mack/South and East

Map Key	Site Name	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
1	Mountain View Exxon	1	1	1	1	1	1	1
2	Cullasaja School	2	2	2	2	2		
3	Little Ellijay		3				2	
4	Walnut Creek	3	4	3	3	3	3	2
5	Goldmine Road		5		4		4	
6	Flat Mountain		6		5		5	
7	Highlands School		7		6		6	
8	Route 28		8		7		7	
9	Village Apartments		9		8		8	
10	Scaly Mountain		10		9		9	
11	Country Store	4	11	4	10	4	10	3
12	Otto Exxon	5	12	5	11	5	11	4
13	Otto School	6	13	6	12	6		
14	Riverside	7	14	7	13	7	12	5
15	Morrison Community	8	15	8	14	8	13	6
16	Union School	9	16	9	15	9	14	7
17	Community Fair Bldg.	10	17	10	16	10	15	8
18	Community Facility Bldg.	11	18	11	17	11	16	9
19	Recreation Park				On Demand			
20	Mashburn Branch	12	19	12	18	12	17	10
21	Middle Grade School	13	20	13	19	13		
22	Flea Market	14	21	14	20	14	18	11
23	Holly Springs #1		22		21		19	
24	Holly Springs Com. Bldg.		23		22		20	

Route 2/White/North and West

Map Key	Site Name	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
25	Education Bldg.	1	1	1	1	1	1	1
26	Patton Springs	2			2			
27	Race Track	3		2			2	
28	Double Churches	4	2	3	3	2	3	2
29	Cartoogechaye School	5	3	4	4	3		
30	Jones Creek	6		5			4	
31	Allison Creek	7		6			5	
32	Rainbow Springs	8						
33	Co-op	9		7			6	
34	Double Branches	10	12	8	5	12	7	3
35	Airport				On Demand			
36	Moody Farm	11	10	9	6	10	8	4
37	Iotla School	12	11	10	7	11		
38	Oak Grove Church	13	15	11	8	15		
39	Snow Hill	14	16	12	9	16	9	5
40	Ruby Mine #1	15	17	13	10	17	10	6
41	Ruby Mine #2	16	18	14	11	18	11	On Demand
42	Cowee School	17	19	15	12	19		
43	Holden's				On Demand			
44	Iotla Bridge	18	13	16	13	13	12	7
45	Sanders Town	19	14	17	14	14	13	8
46	City Restaurant	20	20	18	15	20	14	9
47	East Franklin School	21	21	19	16	21		
48	Franklin High School	22	22	20	17	22		
49	Nantahala #1		4			4		
50	Fiesty Branch		5			5		
51	Quarry		6			6		
52	Nantahala High School		7			7		
53	Below N.H.S.		8			8		
54	Highway 19		9			9		

The time required to service a green box site varies according to the number of boxes at the site, but it should not require any significantly longer amount of time to empty a 6 c.y. container as opposed to one of 4 c.y. capacity. The author of a 1976 Tennessee Valley Authority report advocates the use of 6 c.y. containers wherever possible. The TVA report states that "Overall, the 6 cubic yard container is easier to use than the 8 cubic yard size, and fewer sites, as well as fewer containers, are needed than if the 4 cubic yard size is used". According to local estimates, a site with one container requires about 3 minutes to service, 5 = 15 minutes, 10 = 30 minutes, etc.

There are no separate provisions for collection of bulky items such as appliances and furniture. Instead, these items are placed in or alongside the green boxes, even though this violates the County's ordinance regulating use of the green boxes. Personnel within the Solid Waste Department (usually the CETA-funded positions) have been assigned responsibility for green box site maintenance. These personnel are equipped with a dump truck or pick-up truck and patrol the sites regularly while performing tasks such as clean-up of misplaced solid waste, graveling of pull-offs, removal of obstructions to access and related duties.

Table 14
Methods of Bulky Item Collection

1. Bulky items are collected along with other refuse using compaction vehicles and regular crews.

2. The homeowner calls the collection agency to request that the item be picked up, and the agency sets the date it is to be collected by a separate bulk-pickup crew.

3. Bulky items are collected periodically along defined routes comparable to the regular solid waste routes. Bulk collection is scheduled to cover the whole County in a designated time period, usually one week.

4. The resident sets out the bulky item, the regular refuse collection crew reports it, and it is picked up by a separate bulk-pickup crew.

Source: EPA

Population Served

Table 15 furnishes an approximate estimate of the total population which is served (theoretically) by the green box system. These figures assume that use is limited to parties within Macon County and that parties within the Towns of Franklin and Highlands are served by their respective municipality instead of the County; an allowance has also been calculated for those parties within unincorporated territories (primarily Franklin and Highlands Townships) which are served by private haulers. As such, these figures should be considered only as rough guidelines for planning purposes.

A detailed analysis of the population served by each specific container site has not been included in this report, since the use of a specific site is as much a function of access and convenience as it is of nearby population. The maps of Average Daily Traffic Counts which are published annually by the North Carolina Department of Transportation provide a good resource for planning and analysis of green box sites and their utilization.

Table 15 shows that, in 1979, a total of 13,958 persons were served by the County green box system. This figure reflects only the permanent population, or the November-April period. The population is estimated to roughly double to 27,916 persons during the May-October period.

Table 15
Population Served by Green Box System (1979)
(Permanent Population Only)

Route 1/South and East

Township	1970 Census	Growth Factor	1977 Estimate
Ellijay	967		
Flats	247		
Franklin[1,2,3]	1,932		
Highlands[4,3]	694		
Millshoal	920		
Smithbridge	1,273		
Sugarfork	460		
TOTAL	6,493	+19%[5]	7,726

Route 2/North and West

Burningtown	540		
Cartoogechaye	934		
Cowee	983		
Franklin[1,2,3]	1,932		
Nantahala	848		
TOTAL	5,237	+19%[5]	6,232
GRAND TOTAL	11,730	+19%[5]	13,958

[1] Minus Town of Franklin
[2] 50% of township lies within this route
[3] Estimated 20% collected by private hauler(s)
[4] Minus Town of Highlands
[5] N. C. Dept. of Administration estimate

PERSONNEL

General

The Solid Waste Department consists of ten personnel, (including the Solid Waste Supervisor) and is outlined in the organization chart found in Table 16. The qualificationsand responsibilities of these staff members are varied, but can be grouped into four broad functions: a) administration, b) collection, that is, driving a green box collection vehicle, c) disposal, that is, landfill work, and d) site maintenance and miscellaneous duties. With a few exceptions, a staff member may over a period of time perform more than just one of these functions.

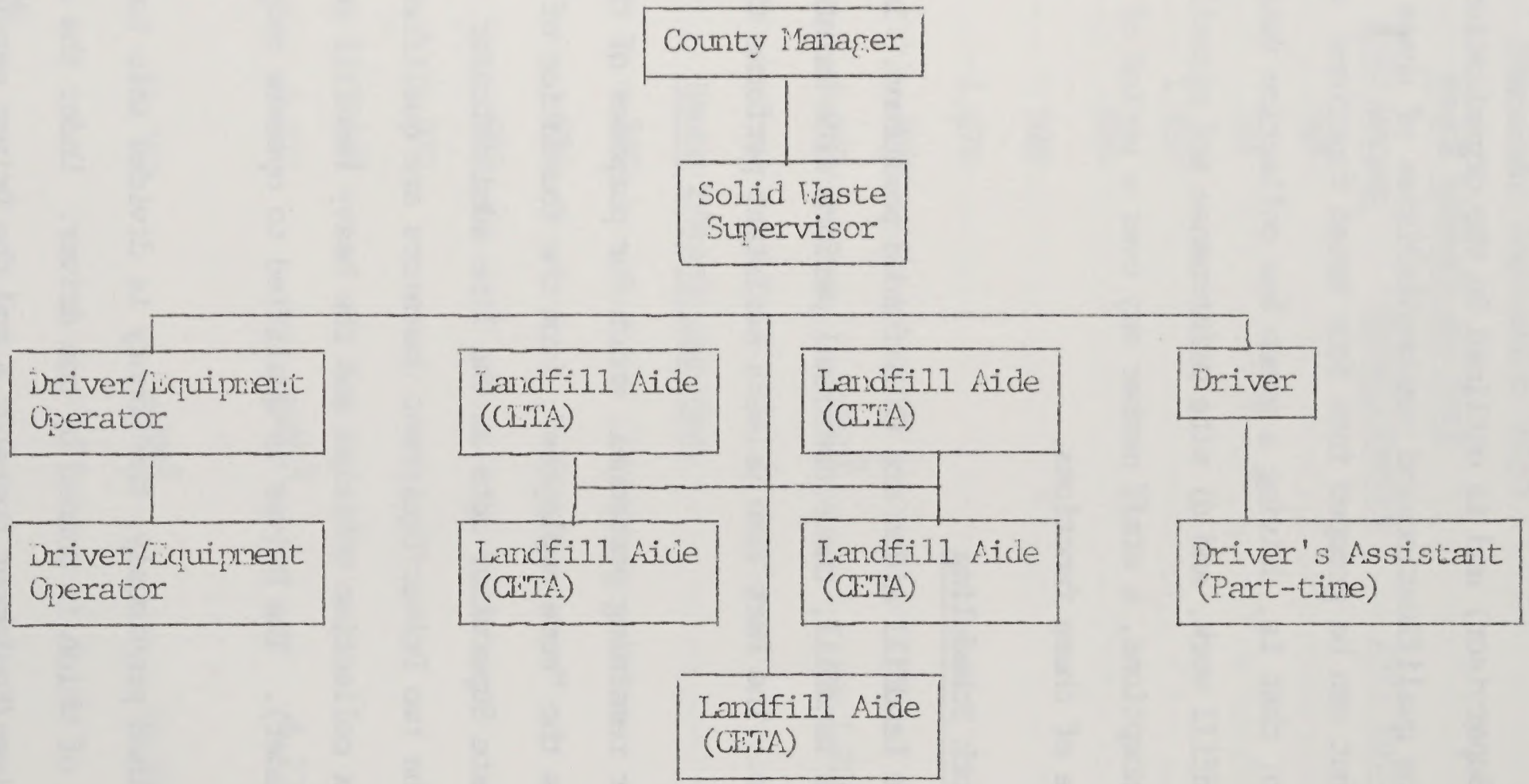
Duties and Work Scheduling

The five Landfill Aides are CETA-funded positions. In addition to their duties at the landfill, these personnel perform site maintenance and miscellaneous duties. The Part Time Drivers Assistant performs the collection function as required.

The four remaining personnel, which for purposes of this report shall be identified as the "core employees", form the foundation of the Department. The Solid Waste Supervisor acts as the line administrator. The Supervisor as well as the two Driver/Equipment Operators are qualified to operate both the green box collection vehicles and the heavy landfill equipment (i.e. the front end loader). The Driver is qualified to operate only the collection vehicles.

As outlined previously, the County is divided into two primary collection routes, each of which is manned by one driver. Under the customary working schedule, Driver/Equipment Operator A and the Driver service these collection routes while the Supervisor and Driver/Equipment Operator B work at the Central Landfill. In order to better understand the work schedule, these personnel

Table 16
Organization Chart (1980)



should be viewed as constituting two separate teams. The work schedule is arranged such that at any given time, the members of Team I are working together on a particular function and the members of Team II are working together on a particular function; a member of Team I never works with a member of Team II on a particular function. Table 17 better explains this arrangement.

Team I	Team II
Driver/Equipment Operator A	Driver/Equipment Operator B
Driver	Supervisor

Green box collection is performed seven days per week, every week of the year (except during severely inclement weather). The Central Landfill is operated six days per week, every week of the year. The Landfill is not open on Sundays, except to allow access by the County collection vehicles. The fact that the Landfill is closed Sundays permits each team to schedule alternating Sundays as days off. Thus, Team I may have the first Sunday in a month off, Team II the second Sunday, Team I the third, etc. This schedule results in a Team completing a full work cycle every two weeks. A team works a Monday-Sunday week followed by a Monday-Saturday week, consequently, a core employee works thirteen consecutive days without a day off. This system can perhaps best be illustrated by the following table.

Table 17
Work Scheduling (November 1979)

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Week One							
Team I	C	C	C	C	C	C	C
Team II	D	D	D	D	D	D	Off
Week Two							
Team I	C	C	C	C	C	C	Off
Team II	D	D	D	D	D	D	C
Week Three							
Team I	C	C	C	C	C	C	C
Team II	D	D	D	D	D	D	Off
Week Four							
Team I	C	C	C	C	C	C	Off
Team II	D	D	D	D	D	D	C
⋮							

C = Collection
D = Disposal

In effect, then, the only deviation from the customary schedule which is caused by retaining Sunday as a day off for one of the teams is that Team II, in lieu of its usual duties at the landfill, performs the collection function on alternating Sundays. Due to the limited Sunday collection schedule (Table 13), an employee works only about four to five hours on that day. During the week (Monday-Saturday) a core employee's work day averages about 8¼ hours in the off-season depending upon the route and number of stops, and about 10¼ hours during the in-season. Periods of heavy demand may also result in an employee relinquishing his scheduled day off. As an overall rule, a core employee's work week ranges from 40 to 56 hours.

FINANCIAL

The Solid Waste Department receives the vast majority of its revenues through the County's General Fund. Table 18 details the actual expenditures for solid waste purposes for Fiscal Years 77-78 and 78-79 as well as the budgeted amounts for FY 79-80.

Table 18
Solid Waste Financial Data (1977-1980)

	FY 77-78	FY 78-79	FY 79-80
Salaries	$20,817.80	$ 25,609.90	$ 51,485.00
Travel	750.75	-	-
Site maintenance	1,536.15	4,586.41	6,000.00
Equipment maintenance	12,497.81	35,597.92	25,000.00
Operations expense	16,913.71	26,136.21	23,000.00
Capital outlay for equip.	4,611.00	47,056.61	-
Contracted services	744.50	-	-
Total	$57,876.72	$138,987.05	$105,485.00

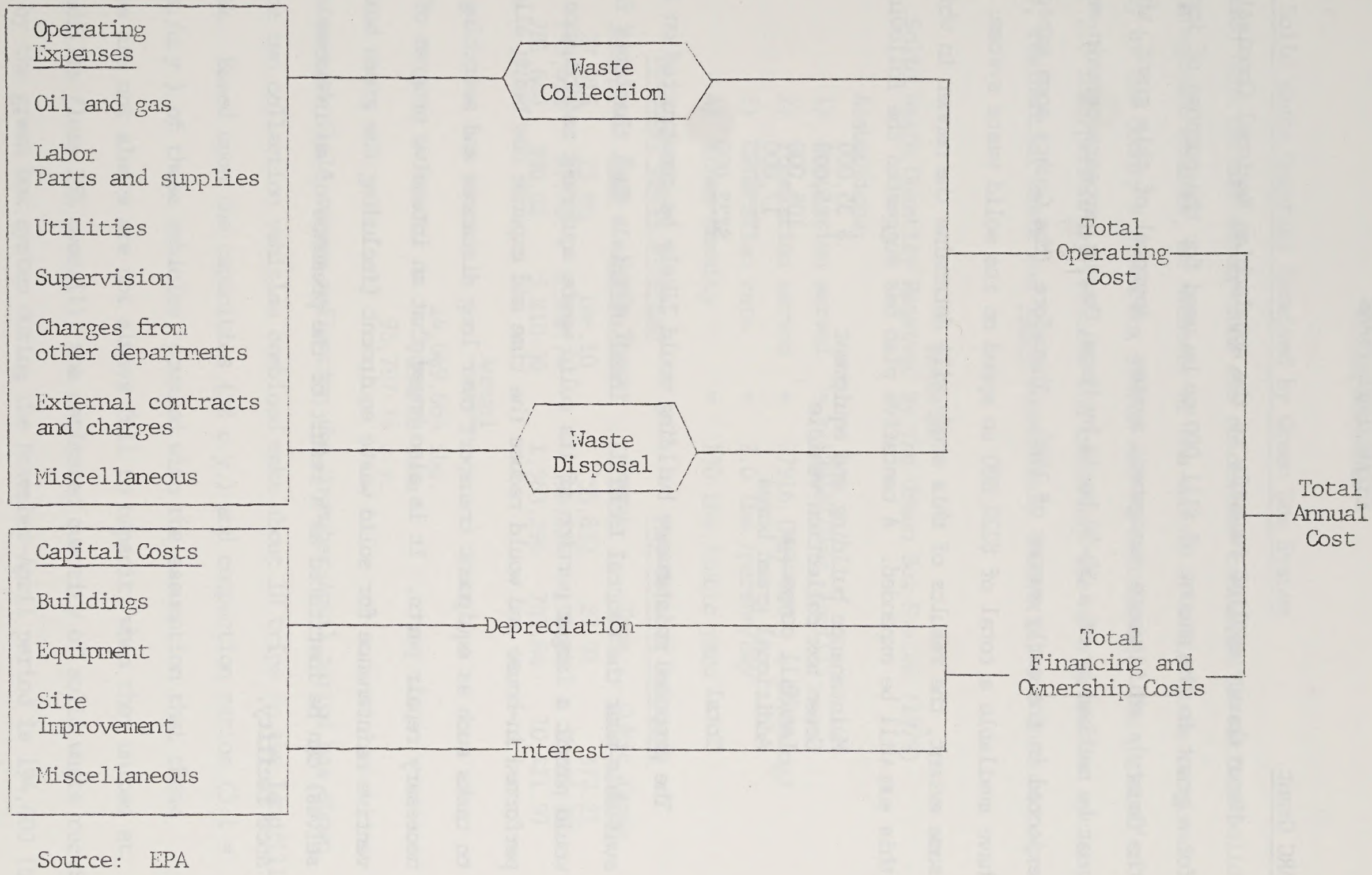
In addition, $11,000 was budgeted for FY 79-80 for the Highlands Landfill subsidy. The County does not currently maintain a capital reserve fund for the purpose of financing large expenditures for the Solid Waste Department.

Due to the manner in which financial information has been maintained, it is not possible to disaggregate the total dollar amounts and assign them separately to either the administrative, collection, disposal or site maintenance functions. The accompanying Table 19, extracted from a U.S. Environmental Protection Agency entitled An Accounting System for Solid Waste Management in Small Communities may be of value in forming a broad outline of costs which can be allocated to the various components of the total annual cost. The EPA report goes on to state that:

> For small communities, two cost centers, one for collection and one for disposal, appear to collect adequate information without incurring excessive accounting expenses. The Collection cost center accumulates all costs associated with the collection of solid wastes on the routes themselves and with the hauling of these wastes from the routes to the disposal site or sites. The Disposal cost center accumulates all the costs associated with the actual disposal of the wastes at the landfill site.

The operating costs must be accurately and representatively allocated to the two cost centers. The allocation of costs to the cost centers and the relationship of these operating costs and the financing and ownership costs to the total annual cost has been illustrated (Table 19). Although financing and ownership costs can be allocated to individual cost centers, the benefits do not justify the additional calculations. For general analysis and control, operating costs are sufficient for cost center analysis. At infrequent intervals, when the additional data are required (for lease-buy decisions, etc.), manual reconstruction is easily accomplished.

Table 19
Allocation of Costs to the Cost Centers and to the Total Annual Cost



Source: EPA

ESTABLISHED PLANS

ARC Grant

Macon County applied recently to the Appalachian Regional Commission for a grant in the amount of $111,000 to be used for the purpose of improving the County's solid waste management system. Approval of this grant, which must be matched by on a 50-50 basis by Macon County, appears certain and is expected in the early summer of 1980. Therefore, the County soon expects to have available a total of $222,000 to spend on its solid waste system. To some extent, the results of this study will determine the manner in which this sum will be expended. A tentative plan has suggested the following:

Maintenance building and equipment	$ 35,000
Green box collection vehicle	65,000
Landfill compactor	105,000
Additional green boxes	17,000
Total	$222,000

The proposed maintenance building would likely be constructed on land available near the Central Landfill. Local officials feel that this facility would permit a larger portion of its solid waste equipment maintenance to be performed in-house and would reduce the time and expense now being allotted to tasks such as equipment transport over long distances and searching for necessary repair parts. It is also hoped that an intensive program of preventive maintenance for solid waste equipment (including the green boxes themselves) can be instituted as a result of the presence of an in-house maintenance facility.

SYSTEM ANALYSES

Annual Solid Waste Quantity Received by Green Box System

Based upon certain assumptions and guidelines contained in various solid waste management studies, an estimate of the amount of solid waste received annually by the County's green box system can be calculated. The generation rate of 2.0 lbs./person/day reflects the customary use of a green box system, that is, residential waste and light commercial, industrial and instutional waste.

Table 20
Solid Waste Quantity Received by the Green Box System (1979)

Assumptions:

1) Population served = 13958 (Nov.-April)
2) Population served = 27916 (May-Oct...a doubling)
3) Generation rate = 2.0 lbs./person/day
4) Loose density = 150 lbs./cubic yard

	November-April Averages			May-October Averages		
	Pounds	Tons	Cubic Yards	Pounds	Tons	Cubic Yards
Day	27,916	13.95	186.10	55,832	27.91	372.21
Week	195,412	97.70	1,302.74	390,824	195.41	2,605.49
Month	781,648	390.82	5,210.98	1,563,296	781.64	10,421.97

Annual

14,069,664 lbs.
7034.83 tons
93,797.76 c.y.

A two-week field survey reflecting the November-April period has shown that the two collection vehicles combined make about 18 trips to the landfills per week. Based upon the capacities (32 c.y.) and compaction ratios (3:1 = 450 lbs./c.y.) of these vehicles, coupled with the assumption that these vehicles are not always are not always full to capacity when they unload at the landfills (less 25% overall), the estimated quantity of solid waste received weekly by the green box system during the November-April period is 194,400 lbs.,

which coincides quite closely with the estimate contained in Table 20.

18 landfill trips x 32 c.y. per truck = 576 c.y.

576 c.y. x 450 lbs./c.y. = 259,200 lbs.

259,200 lbs. less 25% = 194,400 lbs.

Adequacy of Total Green Box System Capacity

Site capacities (Table 12) can be multiplied by weekly collection frequencies (Table 13) in order to produce an estimate of the aggregate weekly green box collection capacity (Table 21). This estimate can then be compared with the estimated quantity of solid waste received weekly by the green box system (Table 20) in order to assess the adequacy of the total system's collection capacity based upon present arrangements. (The distinction between site capacity and collection capacity should be kept in mind throughout this study.)

A one week period has been chosen as the basic unit for this analysis since it constitutes the shortest time span during which a complete collection cycle is made. The May-October season, along with a 20% peak increase factor*, shall also be used as a framework since the system must possess the capacity to accommodate not only average loads but peak loads as well. Table 21 will be modified in order to account for the fact that certain sites receive more frequent collection during the May-October period (Table 13 reflects only the November-April period). The Highlands area, for example, is serviced seven days per week during the in-season, but only three days per week during the off-season.

Table 21 shows that the weekly collection capacity of the green box system is 4178 cubic yards during the May-October season. According to Table 20, 2605 cubic yards of solid waste material is placed into the green box system during an average week during this same season. Therefore, the green box system as a whole possesses the capacity to not only accommodate a peak load of 20% above the May-October average, but could conceivably accommodate a peak load which is 60% above this average. Stated in another manner, the green box system

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*May-October increase = factor of 2; peak increase = factor of 1.2; 2 x 1.2 = 2.4 = 240% = the 140% peak increase assumed earlier in this study (p. 10).

could conceivably accommodate the demand resulting from a population of 44,764 persons as opposed to the peak population of 33,499 assumed in this study.

It is recognized, of course, that this type of analysis is somewhat hypothetical in that it treats only the system as a whole. A site-by-site analysis would perhaps be preferable. For example, one site may have a large surplus capacity while another may have a similarly large deficit. In such a case, a problem exists in that resources have been allocated poorly, but the effect on the bottom line (when viewing the system as a whole) is that one site cancels the other and thereby exposes no problem. It is very difficult to perform a site-by-site analysis, however, due to the obstacles encountered in attempting to pinpoint the population served by a specific site. As mentioned previously, the population served by a specific site is as much a function of accessibility and convenience as it is of nearby population. A resident may, for example, bypass a site which lies only one mile from his/her home in favor of a site which lies three miles from home but which happens to be located on the route to and from work each day. The adequacy of the capacities of the individual green box sites are to a certain extent indicated by the field survey results listed in Table 26. Since the field survey is based on "real world" experiences, a strong case could be made for assigning its results a higher level of credibility than that of any hypothetical analysis (such as the one contained in this section).

The major point which should be borne in mind regarding the preceding analysis is that, under present arrangements, the County's green box system as a whole does (at least in theory) possess adequate capacity. This does not rule out the possibility that, upon arrival, a resident will discover that the site which is normally most convenient to him/her has reached capacity, however, a site which is relatively nearby and which has not yet reached capacity should

be available. Consequently, an excessive sacrifice of convenience on the part of the user should not be necessitated since the overall system should be capable of accommodating his/her demands.

Table 21
Weekly Green Box System Collection Capacity: May-October (1979)

Route 1/SE

Site	Site Capacity	x	Weekly Collection Frequency	=	Weekly Collection Capacity
Mountain View Exxon	32 cy		7		224
Cullasaja School	4		5		20
Little Ellijay	16		3*		48
Walnut Creek	13		7		126
Goldmine Road	8		7*		56
Flat Mountain	46		7*		322
Highlands School	10		7*		70
Route 28	16		7*		112
Village Apartments	4		7*		28
Scaly Mountain	16		7*		112
Country Store	24		7		168
Otto Exxon	16		7		112
Otto School	4		5		20
Riverside	14		7		98
Morrison Community	18		7		126
Union School	16		7		112
Community Fair Bldg.	38		7		266
Community Facility Bldg.	4		7		28
Recreation Park	4		3*		12
Mashburn Branch	22		7		154
Middle Grade School	4		5		20
Flea Market	10		7		70
Holly Springs #1	14		3		42
Holly Springs Comm. Bldg.	8		3		24
Sub-Total					2370 c.y.

*Increased frequency May-October

Table 21 cont.

Route 2/NW

Site	Site Capacity	x	Weekly Collection Frequency	=	Weekly Collection Capacity
Education Bldg.	18 cy		7		126
Patton Springs	4		2		8
Race Track	4		3		12
Double Churches	22		7		154
Cartoogechaye School	4		5		20
Jones Creek	8		3		24
Allison Creek	8		3		24
Rainbow Springs	16		1		16
Co-op	8		3		24
Double Branches	48		7		336
Airport	4		3*		12
Moody Farm	12		7		84
Iotla School	6		5		30
Oak Grove Church	14		5		70
Snow Hill	10		7		70
Ruby Mine #1	14		7		98
Ruby Mine #2	8		7*		56
Cowee School	4		5		20
Holden's	4		3*		12
Iotla Bridge	12		7		84
Sanders Town	12		7		84
City Restaurant	34		7		238
East Franklin School	4		5		20
Franklin High School	10		5		50
Nantahala #1	8		2		16
Fiesty Branch	12		2		24
Quarry	8		2		16
Nantahala High School	8		2		16
Below N.H.S.	20		2		40
Highway 19	12		2		24
Sub-Total					1808 c.y.
GRAND TOTAL					4178 c.y.

*Increased frequency May-October

Annual Solid Waste Quantity Received at the Central Landfill

Using the basic assumptions made in Table 20 along with some modifications, an estimate of the amount of solid waste received annually at the Central Landfill can be calculated. The Central Landfill, of course, receives material from several different sources: the County green box system, the Town of Franklin, private haulers, and various industries, businesses, institutions, etc. who haul directly to the landfill. For the purpose of simplification, it is assumed that the Central Landfill receives all solid waste generated within the County except for that amount which is generated within Highlands Township. The latter is channelled to the Highlands Landfill. The standard generation rate of 2.0 lbs./person/day shall be used for the unincorporated areas served by the Central Landfill while 4.0 lbs./person/day shall be used for the Town of Franklin in order to reflect the concentration of businesses, industries, institutions, etc. in that Town. The inflow to the Central Landfill of: 1) bulky items, agricultural wastes, and wastes from large industrial, institutional and commercial sources which are generated within the unincorporated areas served by the Central Landfill, coupled with 2) waste which is generated within Highlands Township, but which may be disposed at the Central Landfill shall be assumed to be cancelled by 3) material which is incinerated, privately landfilled, dumped illegally, or otherwise diverted from the Central Landfill.

Table 22
Solid Waste Quantity Received at Central Landfill (1979)

Assumptions:

(November-April)

1 a)	Total County population	=	18800
b)	Highlands Township population	=	1725
c)	Population served by Central Landfill	=	17075 (1a minus 1b)
d)	Town of Franklin population	=	2800
e)	Unincorporated area served population	=	14275 (1c minus 1d)

(May-October)

2 a)	Total County population	=	37600
b)	Highlands Township population	=	5175
c)	Population served by Central Landfill	=	32425 (2a minus 2b)
d)	Town of Franklin population	=	4000 (estimate)
e)	Unincorporated area served population	=	28425 (2c minus 2d)
3 a)	Generation rate for unincorporated	=	2.0 lbs./person/day
b)	Generation rate for Town of Franklin	=	4.0 lbs./person/day
4	Loose density	=	150 lbs./c.y.

	November-April Average			May-October Averages		
	Pounds	Tons	Cubic Yards	Pounds	Tons	Cubic Yards
Day	39,750	19.87	265.00	72,850	36.42	485.66
Week	278,250	139.12	1,855.00	509,950	254,97	3,399.66
Month	1,113,000	556.50	7,420.00	2,039,800	1,019.90	13,598.66

Annual

18,916,800 lbs.
9,458.40 tons
126,112.00 c.y.

Annual Space Requirements at the Central Landfill

Table 22 shows that the Central Landfill receives an estimated 18,916,800 pounds of solid waste per year which, at a density of 150 pounds per cubic yard, equals 126,112 cubic yards of loose material. Most of this amount is, however, compacted by collection vehicles at a ratio of 3:1 prior to entering the landfill and may also receive compaction to a limited degree once at the landfill. Assuming that, once in place at the landfill, a density of 500 lbs./ c.y. is achieved and that for every four parts of solid waste material, one

part (volume) of cover material is used, the following estimate of space necessary per year at the Central Landfill results:

Table 23
Annual Space Requirements at Central Landfill (1979)

	18,916,800	lbs./yr.
÷	500	lbs./c.y.
	37,833	c.y./yr. (sub-total)
x	1.2	cover material factor
	45,400	c.y./yr. (total)
x	27	cubic feet per c.y.
	1,225,809	c.f./yr.
÷	43,560	c.f./acre in one acre foot
	28.14	acre-feet/year

Therefore, a total of 45,400 cubic yards or 28.14 acre-feet (one acre at depth of one foot) would be required annually at the Central Landfill. It is not known to what average depth the landfill can be used. At an assumed average depth of 15 feet, 1.88 surface acres would be required annually.

Based on the preceding figures, assuming that present conditions remain fairly constant (i.e. the same institutional arrangements exist for the use of the County's landfill, the level of solid waste recycling does not increase substantially, etc.) and including a 5% annual growth rate to account for increased population and solid waste generation per capita as the County pursues its program of economic development, the following are the projected twenty year requirements for additional County landfill space (in terms of surface acres) using 1979 as the baseline year.

Table 24
Twenty Year Landfill Space Requirements (1980-2000)

Year	Space Required
1980	1.88 surface acres
1985	12.78
1990	26.68
1995	44.40
2000	67.00

Therefore, when viewed from the perspective of the year 1979, an additional 67 surface acres of landfill space will be required by the year 2000.

Time and Mileage Associated with Collection Routes

Table 25, which is based upon a 14-day field survey conducted during the winter months of 1979-80, provides a description of average daily time and mileage associated with the County's green box collection routes, as well as accrued annual totals.

Table 25
Route Time and Mileage (1979-80)

Route 1/Mack/South and East	Nov.-April	May-Oct.	Annual
Population served	7,726	20,750	-
Average daily mileage on route	66	92	79
Average daily time on route (hrs.)	8.0	10.8	9.4
Route 2/White/North and East			
Population served	6,232	7,166	-
Average daily mileage on route	90	103	97
Average daily time on route (hrs.)	8.5	9.8	9.2
Both Routes			
Population served	13,958	27,916	-
Average daily mileage on routes	156	195	176.0
Average daily time on routes (hrs.)	16.5	20.6	18.6

Totals for One-Year Period (Accrued Totals)

	Route 1	Route 2	Both Routes
Mileage	28,440	34,920	63,180
Time (hrs.)	3,384	3,312	6,696

Source: November-April figures projected from field survey... all other figures are estimates based on calculations and assumptions.

CHAPTER FOUR

PROBLEM IDENTIFICATION/RECOMMENDATIONS/ALTERNATIVES

OVERVIEW

The following sections of this study shall address some of the problems which Macon County's solid waste management system faces, along with recommendations and in some cases, alternative arrangements which the County may wish to consider in solving these problems. As a general rule, the County's solid waste management system is functioning smoothly and provides a much-needed service to Macon County in an efficient and responsive manner. Consequently, there is no compelling reason to completely overhaul the current framework of site locations, collection routes, collection frequencies, personnel, equipment, administration and so forth within which the system now operates. This is not to say that room for improvement does not exist, however, the County should view its current methods of operation as a desirable base from which to build rather than as an obsolete system which should be abandoned. As a consequence, the recommendations which follow shall assume that the present structure of the system will continue.

PROBLEMS AND RECOMMENDATIONS

Problem #1) Adequacy of Green Box Capacity by Individual Site

A 14-day survey of individual green box sites conducted during December 1979 and January 1980 yielded the following indicators (Table 26) of the adequacy of capacity on a site-by-site basis, as contrasted with the total system capacity analyzed elsewhere in this study. Those sites which are consistently filled to capacity should be assigned top priority when allocating resources to increase collection capacity (i.e. increasing site capacities and/or collection frequencies).

As a short-term solution to deficient site capacity, the County should expand existing sites rather than establish new sites. Over the long-term (especially if a decision is made to implement a planned site system) the establishment of additional sites may become necessary. In order to determine which fundamental method of correcting deficiencies in collection capacity is most favorable (i.e. expansion of site capacity at an existing site, and/or establishment of additional sites, and/or increase in collection frequency) each deficiency must be examined on a case-by-case basis. An appropriate solution to one problem may not be adaptable to a seemingly similar problem.

It is recommended specifically that a field survey of the type conducted during the winter months of 1979-80 (reflecting the November-April period) should also be conducted during the more active May-October period in order to account for factors such as peak loads. The results of the two field surveys, when combined, should provide a more complete picture of site and system adequacy for decision-making purposes. Most observers of the County's solid waste management system agree that the system functions smoothly during the November-April period and that deficiencies of a serious nature occur primarily during the May-October period.

Table 26
Adequacy of Green Box Capacity by Individual Site: November-April (1979-80)

Site Name	% Of Collection Days When Filled 1/2	3/4	Full
Mountain View Exxon	10%	50%	40%
Cullasaja School		33%	67%
Little Ellijay		33%	67%
Walnut Creek		80%	20%
Goldmine Road			100%
Flat Mountain			100%
Highlands School	20%		30%
Route 28			100%
Village Apartments			100%
Scaly Mountain			100%
Country Store		44%	56%
Otto Exxon		33%	67%
Otto School	20%	20%	60%
Riverside		50%	50%
Morrison Community		60%	40%
Union School		30%	70%
Community Fair Building		40%	60%
Community Facility Building	14%		86%
Recreation Park	-		
Mashburn Branch		40%	60%
Middle Grade School			100%
Flea Market	14%		86%
Holly Springs #1			100%
Holly Springs Community Building			100%

Table 26 cont.

Site Name	% Of Collection Days When Filled 1/2	3/4	Full
Education Building		21%	79%
Patton Springs	13%	37%	50%
Race Track	38%	62%	
Double Churches	30%	60%	10%
Cartoogechaye School		33%	67%
Jones Creek	50%	34%	16%
Allison Creek	20%	60%	20%
Rainbow Springs			100%
Co-op	43%	43%	14%
Double Branches	7%	72%	21%
Airport	40%	20%	40%
Moody Farm	15%	70%	15%
Iotla School		50%	50%
Oak Grove Church	11%	78%	11%
Snow Hill	21%	72%	7%
Ruby Mine #1	42%	50%	8%
Ruby Mine #2	17%	33%	50%
Cowee School		30%	70%
Holden's	13%	50%	37%
Iotla Bridge	21%	72%	7%
Sanders Town	14%	43%	43%
City Restaurant			100%
East Franklin School			100%
Franklin High School			100%
Nantahala #1			100%
Fiesty Branch			100%
Quarry			100%
Nantahala High School		25%	75%
Below N.H.S.		25%	75%
Highway 19		25%	75%

Problem #2) Potential Green Box Site Improvements

Site Name	Problem/Recommendation
Little Ellijay	Requires an 8.4 mile round trip out of the mainstream of the collection route (U.S. 64/N.C. 28) in order to service only this site. Should either increase site capacity at Little Ellijay in order to reduce the required collection frequency or, if the vast majority of the users of this site pass by the Mountain View Exxon or Holly Springs sites frequently, the Little Ellijay site should be eliminated and accompanied by an increase in the collection capacity of the Mountain View Exxon and/or Holly Springs sites.
Flat Mountain	Ten green boxes on a site which is heavily used, congested and lacks a good pull-off area. Site clean-up of misplaced material is a problem. Although the containers are somewhat hidden from public view, they do not appear to have been abused. The site could be better managed and made safer if it were disaggregated into two or three smaller sites. The present size of the site is, however, a direct result of the overall lack of sites acceptable to the public in the Highlands area.*
Village Apartments	Site is probably sufficient if it is intended to serve only the apartments. If not intended for this purpose, it is too hidden from public view and does not invite use by the general public (nor does it have the capacity to do so). Is unlikely to be abused since it is situated very close to apartments.*
N.C. 28	The route traveled by the County collection vehicles in order to reach this site is very steep and results in severe wear on equipment. In addition, the site itself is situated on a relatively steep grade. Site clean-up of misplaced material has become a chronic problem. A major negative point also lies in the fact that the site is located in the vicinity of the Highlands Landfill and has apparently come to be viewed by much of the public as an alternate landfill. For example, many persons who would normally use the Highlands Landfill instead either abbreviate their trip by stopping at the N.C.

*Subject of "Alternatives" section of this report also.

N.C. 28 cont.	28 site or use the site as a back-up facility when the Highlands Landfill is closed. The resulting burden on the N.C. 28 site as well as the County's personnel and equipment has become excessive. It is recommended that this site be discontinued, perhaps on a trial basis. The elimination of this site may also open up the possibility of alternate routings of collection vehicles which might prove to be cost-effective.*
Scaly Mountain	The site itself possesses no problems and its existence is probably necessary in order to accommodate the needs of the area. The existence of this site is, however, the major reason why collection vehicles must travel a very steep grade (N.C. 106 leading from the site into Georgia). The resulting wear on vehicles and unsafe traveling conditions necessitate an evaluation of alternatives.*
Country Store Otto Exxon	Both sites are located directly adjacent to private businesses, which discourages abuse but creates a minor congestion problem. The relative abundance of open, level land in the area presents the opportunity for consolidation of these two sites into a single site with large site capacity. If the consolidated site were situated north of the present Country Store site, an opportunity would exist to reduce the travel requirements of collection vehicles.
Riverside Morrison Community Union School	Site conditions are generally good, with the exception of Riverside, which becomes difficult to service and use during wet weather. This site is also hidden from public view, has been abused (e.g. misplaced material), and is difficult to maintain. It would be ideal if these three sites could be consolidated into a single site with large site capacity. Consolidation into a location of U.S. 441 would facilitate more cost-effective routing. A site located at the intersection of U.S. 441 and S.R. 1124 has been suggested by the Solid Waste Department staff.

*Subject of "Alternatives" section of this report also.

Holly Springs #1 Holly Springs Community Center	Each site serves essentially the same clientele. Consolidation into a single site with capacity equal to that of the two individual sites is recommended provided that a site suitable for this purpose can be located.
Patton Springs	Located on a short, private dirt road somewhat hidden from public view. Should ideally be relocated onto nearby public road in order to discourage abuse and encourage greater use by public.
Race Track	Pull-off area becomes very muddy and access is poor during wet weather. Site clean-up is also difficult. Pull-off area should be graveled or site should be relocated in order to remedy this situation. The collection schedule should be adjusted to coincide to a greater degree with that of Patton Springs. Consolidation with Patton Springs should also be considered, perhaps near the intersection of S.R. 1146 and 1148.
Jones Creek Allison Creek	Access to both sites is undesirable. Also, the locations of these sites are out of the mainstream of the route followed by County collection vehicles. Sites should be consolidated into a single site with capacity equal to that of the two separate sites. The intersection of S.R.'s 1301 and 1328 appears to be suited for this purpose.
Quarry	Green boxes are rusted/burned and should be replaced.
Highway 19	Located within the scenic and heavily-traveled (tourist) Nantahala Gorge area near the juncture of four counties. Provides a much-needed service in that it aids in keeping the Gorge area clean, but its greatest use is produced by parties not connected directly with Macon County. Also receives a large quantity of bulky items such as old kitchen appliances, which in turn makes site clean-up difficult. It is debatable as to whether this site should be retained. The establishment of an additional site oriented toward use exclusively by parties connected with Macon County should be considered. A location a short distance off of U.S. 19

Highway 19 cont.	on S.R. 1310 may prove to be favorable for this purpose.*
Snow Hill Ruby Mine #1 Ruby Mine #2	The containers at the Snow Hill site are placed too close to the road and should be moved back a short distance in order to permit safer access. Consolidation of these three sites into a single site with equal capacity would be desirable, provided that such a change is consistent with the seasonal demands of the tourist-oriented Cowee area. The intersection of S.R.'s 1343 and 1349 appear to be a logical choice for a consolidated location. As an alternative, the County may wish to consider (if feasible) an arrangement consisting of a consolidated site during the off-season and separate sites during the in-season.
Holden's	Existence of site does not appear to be justified. The single container at this site should be integrated with a nearby site (e.g. Iotla Bridge), thereby eliminating the Holden's site.
Iotla Bridge	The short dirt access road to the site is steep, but not excessively so. Some relatively minor site improvements should be undertaken in order to correct this condition.
Double Branches	In terms of both site capacity and collection capacity, this is the largest site in the County. The pull-off area is very rutted and muddy and should be graded and graveled. This action would also enable more thorough site clean-up.
City Restaurant	Another large site which is heavily used. Additional pull-off space and a well-graveled surface are needed.
Various sites located at public schools	Most of the green box sites which are located at public schools are intended for the primary use of the schools themselves. (An exception is the Union School site.) Public use of these sites should be discouraged since, in most cases, congestion and attendant safety considerations do not favor use by the general public.

*Subject of "Alternatives" section of this report also.

Problem #3

The fact that the County owns so few of its green box sites presents an obstacle to the development of a planned site system. A planned site system would present a better opportunity (than does the current semi-planned system) to accomplish objectives such as: reductions in collection routes, expansion of site capacity where necessary, continuation of service in areas where securing a site through a means other than direct ownership has proven difficult, and so forth. The current semi-planned system based upon non-County site ownership has, however, produced virtually no cost to the County for the use of the sites themselves. Therefore, it is recommended that, over the short-term, sites be purchased by the County only where there is a clear need to do so and that the development of a planned site system become a long-term goal.

Problem #4

The present central Landfill site, coupled with nearby tracts of land which may potentially be made available to the County for the purpose of landfilling, appear to possess the capacity to accommodate the County's solid waste disposal responsibilities for the foreseeable future, especially in terms of surface acreage. A recent on-site analysis, however, seems to indicate that soil limitations will pose a considerable constraint to the efficient landfilling of solid waste on these tracts (see Appendix). The County may wish to consider alternate sites, such as an abandoned quarry on U.S. 64 west, as sources of reserve landfill space. It is recommended strongly that landfill design, operations, lifespan, etc. be examined by a person/firm (i.e. professional engineer) capable of providing a detailed analysis of landfill conditions and plan for future landfill operations. It is also urged that the County, consistent with any such analyses or plans, begin <u>immediately</u> to secure the landfill space required to meet its 20-year needs...it is never too early for this step.

Problem #5

Two of the County's three collection vehicles (front-loading compactor trucks) have received a great deal of use. At least one of these vehicles must soon be either replaced or rehabilitated.

Problem #6

The County currently utilizes about two and one-half times as many 4 cubic yard as 6 cubic yard containers. In order to yield maximum productivity, the County should move toward the establishment of a system comprised entirely of 6 cubic yard containers. A 6 cubic yard container costs only about 33% more than the 4 cubic yard size, yet has 50% greater capacity. Also, the service time and site space required to accommodate the 6 cubic yard size is not significantly greater than for the 4 cubic yard size.

Problem #7

In order to discourage abuse of green box sites, the sites should be located in full view of the public.

Problem #8

The County should acquire a landfill compactor in order to obtain the maximum lifespan from its landfill. The necessity to extract maximum lifespan will become especially critical in the future due to a general decrease in the availability of tracts suitable or acceptable for landfilling. A good landfill compactor could potentially double the useful life of the landfill. Several types of compactors exist on the market, ranging from the large, self-contained units (cost est. $100,000) to a small tow-behind unit which attaches to a tractor and thereby permits greater versatility (but less compaction) than the self-contained unit.

Problem #9

The collection of bulky items within the County places a burden on both personnel and equipment under the current collection system. Many bulky

items (e.g. kitchen appliances, mattresses, furniture, etc.) are placed at the green box sites even though this constitutes a violation of the County's green box utilization ordinance. The County may wish to examine the feasibility of instituting one of the methods of bulky item collection outlined in Table 14.

Problem #10

Funding for the five CETA workers now employed by the Solid Waste Department could be discontinued by May, 1980. If the Department is to continue to function at its present strength, decision-makers should be alerted to this possibility when formulating the FY 1980-81 budget.

Problem #11

Private commercial solid waste haulers who are not franchised should be identified and franchised by the County.

Problem #12

Current practices do not provide for separate accounting of the solid waste collection and disposal functions. In order to better evaluate the performance of the solid waste system, separate accounting should be instituted using the EPA publication An Accounting System for Solid Waste Management in Small Communities. The County should also consider the establishment of a capital reserve fund for the purpose of financing major purchases for the solid waste system.

Problem #13

The lack of an in-house solid waste equipment maintenance facility has resulted in an ever-increasing expenditure of time and funds on the part of the Solid Waste Department staff (e.g. searching for needed parts, transporting out-of-service vehicles). The establishment of an in-house facility should reduce this cost component appreciably. The overall cost-effectiveness to the County of such a facility is, however, beyond the scope of this

study and can be neither encouraged nor discouraged until a separate, detailed analysis of this situation is conducted.

Problem #14

A formalized, on-going system of reporting and judging the conditions of the various green box sites (e.g. sites which need gravel, green boxes which are rusted out and need to be replaced, sites which frequently overflow) does not currently exist. This study can be viewed as a first step toward addressing this problem. The County may wish to institute a green box site "status report" system patterned after that contained in the EPA publication Improving Rural Solid Waste Management Practices. A similar system might be utilized for reporting illegal dumping of solid waste and could potentially link-in with the reporting system for bulky item collection if a bulky item collection alternative requiring a reporting system were chosen.

Problem #15

In order to control problems such as the overflowing of green boxes, the County may wish to publish and disseminate to the public a collection schedule such as a simpler version of that embodied in Table 13. A resident could then anticipate the intervals at which the green boxes are collected and plan his/her trips to the sites accordingly. In order for this mechanism to work successfully and to gain the confidence of the public, it will first become necessary for the collection schedule to become completely standardized.

Problem #16

Currently, there exists only one piece of heavy equipment at the Central Landfill which is capable of moving and covering solid waste. In order to provide for reserve capacity in the event of breakdown, the County should always have immediate access to a back-up loader or dozer. This could be accom-

plished by either acquiring another loader/dozer or maintaining a rental or leasing agreement for such equipment, preferably with a local firm.

Problem #17

The Town of Franklin's recent decision to finance its solid waste collection service on a user fee basis rather than through general revenues will inevitably result in increased demand for County green box service in and near Franklin. The full impact of this measure cannot be evaluated at this time; further study should be undertaken once the user fee system has been in operation for several months. The County should prepare itself to begin providing increased green box service consistent with the demand which is experienced in the Franklin area.

PROBLEMS AND ALTERNATIVES

1) Personnel

At the present time, the Solid Waste Department's four core employees (Supervisor, two Driver/Equipment Operators and Driver) are working an extraordinary number of hours and days per week. Each core employee has only one day off (alternating Sundays) every two weeks. All core employees are currently working more than 40 hours per week, the work schedule is especially demanding during the summer months, and little time seems to be available for duly earned annual leave. The County's solid waste system is working very well under this arrangement . . . green boxes are collected on time, sites are clean, and personnel seem to be pleased with their overall working conditions. In order to avoid the potential for morale problems, however, these personnel should be provided with a work schedule which possesses enough built-in flexibility to permit sufficient days off, annual leave, and opportunities for training and instruction.

The duties and qualifications of the core employees are outlined in detail in pp. 41-44. Basically, all four core employees are qualified to drive the collection vehicles while only three are qualified to operate the landfill equipment. With only minor variations, the duties of Team I (Driver Equipment Operator A and Driver) consist of servicing the two major collection routes while the duties of Team II (Driver/Equipment Operator B and Supervisor) consist of operating the landfill equipment. The County should continue to operate under this basic arrangement, but by instituting a few revisions and making certain provisions, the necessary flexibility to achieve the objectives outlined above can be realized. As an alternative to the work schedule listed in Table 17, the following measures should be effected:

-There should continue to be two primary collection routes, referred to in Table 27 as Routes X and Y.

-It will be necessary to maintain at least three mechanically sound collection vehicles (i.e. front loaders) in order to ensure that two collection vehicles will always be available to service the collection routes, that is, at least one collection vehicle will always be available in reserve.

-The solid waste system should operate six days per week, Monday-Saturday. All personnel should receive Sunday off as well as one other day off during the week.

-If a landfill compactor were purchased by the County, (Team II) Driver Equipment Operator B and the Supervisor must immediately be qualified to operate it. In order to achieve maximum flexibility, the Team I employees (Driver/Equipment Operator A and Driver) should also be qualified to operate the compactor; the Driver should, of course, also be qualified to operate the present heavy landfill equipment.

-Upon the completion of their daily route schedules, the personnel performing the collection function should perform duties such as the cleaning and maintenance of vehicles and green boxes.

-The non-core employees (e.g. CETA workers) should continue to carry out the function of site maintenance and miscellaneous duties.

-The team concept should continue to form the framework for the core employee's work schedule, however, if the work schedule listed in Table 27 were implemented, there would necessarily be some deviations from the team arrangement as it currently exists. On certain workdays, for example, only three employees would work while the fourth would have a day off. Also, there would not be a strict separation in the duties of each team since certain personnel would alternate between teams.

-The work schedule listed in Table 27 assumes that the:

a) Driver will service a collection route.

b) Driver/Equipment Operator A will service a collection route.

c) Driver/Equipment Operator B's duties will consist primarily of operating the landfill, but will also consist of servicing a collection route whenever the Driver or Driver/Equipment Operator A has a day off during the Monday-Saturday period.

d) Supervisor will work primarily at the landfill, but will also devote more time than in the past exclusively to the administration function. The Supervisor will oversee the entire solid waste system, including collection operations, landfill operations, personnel, site maintenance, etc. In addition, the Supervisor will occasionally service a collection route whenever one of the other core employees is on annual or sick leave.

Table 27
Alternative Work Schedule (Example)

Employee	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Driver	Off	X	X	X	X	X	Off
Driver/Equip. Op. A	Y	Y	Off	Y	Y	Y	Off
Driver/Equip. Op. B	X	L	Y	Off	L	L	Off
Supervisor	L	L/A	L	L	L/A	Off	Off

X = First collection route
Y = Second collection route
L = Landfill
A = Administration

It should be emphasized that this work schedule is only an example of an alternative arrangement. For instance, if all of the core personnel are qualified to operate the compactor and other heavy landfill equipment, the Supervisor could rotate duties (perhaps on a monthly basis) in order to

provide these employees with a variety of work experience. In addition, a rotation system would enable all employees to occasionally have two consecutive days off.

It should also be stressed that if the alternative work schedule were implemented, thereby eliminating Sunday collection, the site capacity of those green box sites which are currently collected on Sunday should be increased in order to compensate for the reduced collection frequency. This measure would be especially necessary in view of the fact that Saturday and Sunday are days of very high user demand. It has been pointed out by the Solid Waste Department staff that the decision to eliminate Sunday collection, if implemented, should be a permanent one in order to provide stability and to maintain a high staff morale.

2) Highlands Landfill Fee

Macon County's solid waste collection vehicles customarily utilize the Highlands Landfill whenever a collection run is made to the Highlands area. The County pays a flat annual fee to the Town of Highlands for this service, which during FY 1979-80 was estimated at $11,000.

As an alternative to the flat annual fee system, the County may wish to seek an arrangement based upon a "per ton" fee for the use of the Highlands Landfill. The generally-accepted cost for the landfilling of solid waste in Western North Carolina at the time of this report ranged between $2.00 and $3.00 per ton. The minimum effective cost per ton incurred by the County under the current flat fee system can be calculated as follows:

Table 28
Current Effective Cost Per Ton
For Use of Highlands Landfill (FY 79-80)

Maximum number of trips made annually by County to Highlands Landfill (one per Highlands run)
= 260 trips

Maximum number of tons per trip (32 c.y. per trip; 450 lbs. per c.y.)
= 7.2 tons

Maximum number of tons deposited annually by County into Highlands Landfill
= 1872

Minimum cost per ton to County @ $11,000 annually
= $5.87

Suggested annual flat fee (1872 x $2.50)
= $4680

Therefore, the County is at a minimum paying roughly double the generally-accepted cost per ton ($5.87 versus $2.00-$3.00). Stated in another manner, a flat annual fee of $4680 (@ $2.50 per ton) would appear to be more reasonable than would $11,000. Since the County is achieving a relatively high compaction density (450 lbs./c.y. compared to 150 lbs./c.y. for uncompacted

solid waste), an analysis of cost per cubic yard might show an even greater disparity.

The decision to either maintain the current flat fee system or to seek a revised system of payment should be approached cautiously, since a move to a revised system may be accompanied by many ripple-effects for both the County and Town of Highlands.

3) Servicing the Highlands Area

The collection of solid waste in the Highlands area presents several problems for the County. These problems are outlined in pp. 19 and 20. In this section, two basic alternatives to the current method of solid waste collection in the Highlands area shall be examined. Both alternatives would constitute separate, independent routes; that is, they would serve only the Highlands area. These alternatives are: a) a network of new 40 c.y. roll-off containers collected by a new collection vehicle equipped to handle this function and b) a network consisting of the present green boxes in the Highlands area collected by an additional (old, rebuilt, or new) 32 c.y. front loading vehicle. For the purposes of this study, the Highlands area shall be deemed to be composed of the area served (generally) by the following green box sites:

-Goldmine Road
-Flat Mountain
-Highlands School
-Route 28
-Village Apartments
-Scaly Mountain

It should be noted that these sites have been selected primarily due to the fact that, if an independent route were established to accommodate their service areas, the necessity for collection vehicles to travel along the hazardous grades leading to and from the "Highlands Plateau" would be eliminated. The nearby Highlands Landfill would serve as the disposal point for solid waste under both alternatives, thereby aiding in operating an independent route in an efficient manner. It should also be noted that in preparing the cost analyses for the various systems, it will be very difficult to assign a value to some of the benefits which may accrue to the County in the event that one of the listed alternatives is chosen. Reducing safety hazards is, for example, a definite benefit

but not one which can easily be quantified in terms of dollars and cents. The choice of a system to serve the Highlands area will, then, be essentially a management and policy decision. Accordingly, unless a clearly superior alternative emerges, this study shall refrain from making a recommendation as to a system to serve the Highlands area. An additional complicating factor lies in the fact that the Town of Highlands may soon annex a large portion of the unincorporated territory which now depends upon the County green box system for solid waste collection. Such an action, especially if the Town's municipal solid waste collection system is mandatory for its constituents, will almost certainly reduce the demand for County green box service in that area. For the purposes of this study, however, it shall be assumed that the Town of Highlands will not expand its corporate limits.

In order to determine the cost effectiveness of both alternatives, the following cost analyses will be conducted:

(a) the costs of operating the 32 c.y. collection vehicle on Route 1/South and East as it now exists

(b) the costs of operating the present 32 c.y. collection vehicle on Route 1/South and East exclusive of the Highlands area

(c) the costs of operating a 40 c.y. roll off system to service the Highlands area only (Alternative)

(d) the costs of operating an additional 32 c.y. collection vehicle (perhaps an older model) within the Highlands area only (Alternative)

The differential in the cost of a minus b would represent the cost savings to the County in eliminating the Highlands area from the present Route 1. If the cost of either alternative is subsequently less than this cost savings, then that alternative would be cost-effective for the County. It should be pointed out that labor costs are not included in these

estimates since, as presently envisioned, no additional labor manpower or time would be required in order to implement either alternative. Rather, the driver of the present Route 1/South and East would serve the Highlands area as well as the remainder of Route 1 when (if) this route is restructured. In order to accomplish this, the driver of Route 1 might, for example, service the green boxes on Route 1 until he reaches Walnut Creek, drive to the Highlands area in a small vehicle, service the Highlands area, and return to Walnut Creek in the small vehicle where he would then resume his duties on Route 1.

Another factor involved in the cost estimates is the manner in which the purchase price and depreciation of the vehicles themselves has been treated. An attempt has been made to make each of the four cost estimates comparable by assuming that all vehicle costs reflect a single fixed time period. For example, the purchase price of the 32 c.y. vehicle now servicing Route 1 was about $65,000 and was incurred in 1976. The purchase price of the same 32 c.y. vehicle today (1980, in order to service the Highlands area) would be in the range of $75,000-$80,000, but will be treated as $65,000 in order to make the annual costs of each system comparable. If two separate time frameworks had been used, the data presented would have perhaps been more indicative of actual costs which the County might incur should it choose to implement one of the alternatives, but the comparability of systems (which is the chief objective of this study) would have been distorted. The depreciation periods employed are based upon a useful vehicle life of 175,000 miles. Thus, at 50,000 miles per year the depreciation period would be three and one-half years, at 25,000 miles/year would be seven years, etc.

One final note . . . the cost estimates for the present system which follow will not coordinate precisely with the figures contained in Table 18 due

to factors such as period during which cost was incurred, variations in costs of registration and insurance, and so forth. The figures in Table 18 are actual expenses while the following cost estimates were supplied by a private solid waste equipment firm and are intended to reflect the high end of a cost range.

Cost of Operating 32 c.y. Collection Vehicle on Route 1 As it now Exists

The Highlands area is presently contained within Route 1, which serves the entire southern and eastern sections of the County. The total annual cost of operating this route is detailed as follows:

Table 29
Collection Vehicle to Serve Route 1
Annual Cost Estimate

1)	Vehicle depreciation ($65,000 purchase price over 6-year period using straight line method and no salvage value)	$10833
2)	Insurance	850
3)	Registration	500
4)	Tires (@ 3½ cents per mile)	2422
5)	Fuel (@ 1.15 per gallon; 4 mpg)	8194
6)	Maintenance & repair (@ 12% of purchase price)	7800
7)	Oil and filters (@ 2½ cents per mile; changed approximately every 4000 miles)	712
8)	Grease	175
	Total Annual Costs	$31486
	Total Annual Mileage	28500
	Cost Per Mile	$1.105

Cost of Operating 32 c.y. Collection Vehicle on Route 1 Exclusive of the Highlands Area

If the Highlands area were eliminated from Route 1 by virtue of the establishment of an independent route to serve that area, certain costs associated with operating Route 1 should decline in response to factors such as the reduced distances traveled. If the basic structure of the remainder of Route 1 is retained, however, the reduction in mileage (or hours of operation) will perhaps not be as significant as one might anticipate. This is due directly to the fact that when the Highlands area is served, an efficient loop-shaped route is followed. If the Highlands area were eliminated from Route 1, a significant degree of backtracking would then be required on the remainder of the route. As a result, the net savings in mileage would be only about 20 miles for each of the 260 trips made to the Highlands area annually, or a total of 5,200 miles annually (this figure accounts for trips to a landfill). In addition to vehicle costs which are linked closely with distance traveled, it shall be assumed that maintenance costs will also decrease. This decrease in maintenance costs will perhaps even be disproportionate (i.e. greater than the decline factor in mileage) since the rugged topographical conditions which are encountered in reaching the Highlands area can be avoided.

Table 30
Collection Vehicle to Serve Route 1 Exclusive of Highlands Area
Annual Cost Estimate

1)	Vehicle depreciation ($65,000 purchase price over 7½ years using straight line method and no salvage value)	$ 8666
2)	Insurance	350
3)	Registration	500
4)	Tires (@ 8½ cents per mile)	1980
5)	Fuel (@ 1.15 per gallon; 4 mpg)	6698
6)	Maintenance and repair (@ 9% of purchase price)	5850
7)	Oil and filters (@ 2½ cents per mile; changed approximately every 4000 miles)	583
8)	Grease	145
	Total Annual Costs	$25272
	Total Annual Mileage	23300
	Cost Per Mile	$1.085

Cost Savings Resulting from Elimination of Highlands Area from Route 1

Therefore, the annual cost savings which would accrue to the County by virtue of eliminating the Highlands area from Route 1 would be $6214, illustrated as follows:

$31486	Route 1
25272	Route 1 less Highlands area
$ 6214	

This savings must now be compared with the costs necessary to provide an alternate means of service to the Highlands area, specifically, the two alternatives cited at the beginning of the section. If the annual cost of an alternative is greater than $6214, it will be more efficient from a strict dollars and cents perspective to maintain the present system of service (i.e. Route 1 as it now exists).

Cost of Operating 40 c.y. Roll-Off System to Serve Highlands Area

The 40 cubic yard roll-off container system envisioned as an alternative means of collection for the Highlands area is somewhat similar to a green box system (e.g. 4 to 8 c.y.) in that both are bulk storage container systems . . . but there are also many key differences. For example, the 32 c.y. collection vehicle currently utilized in servicing the green box system is unable to service the 40 c.y. containers. The fact that 32 is less than 40 is not the reason for this inability, rather, the reason is simply that the front loading type vehicle is not fitted with the equipment necessary to perform this function. Instead, a vehicle with the capacity to roll these large 40 c.y. containers onto and off of the rear end of the collection vehicle is required. The 40 c.y. container, unlike the smaller green box unit, is not emptied at the collection site by the collection vehicle, instead, the container itself is rolled on and is transported to the landfill where it is unloaded . . . in its place, the empty 40 c.y. container serviced previously is rolled off and left behind.

It must be remembered that the 32 c.y. vehicle, which possesses the capacity to compact loose solid waste at a ratio of roughly 3:1, can actually hold about 96 (equivalent) c.y. of loose solid waste. The 40 c.y. vehicle does not (normally) possess compaction capacity and can therefore accommodate only 40 c.y. of loose solid waste. This situation alone represents a limitation of the 40 c.y. system: Specifically, a maximum of 40 c.y. can be transported on a run to the landfill as opposed to roughly two and one-half times this quantity (96 c.y.) with the front loading system. Thus, a basic trade-off exists: The 40 c.y. system (if properly planned) results in less distance traveled between collection sites but more distance traveled in making trips to a landfill.

Perhaps the chief advantage of the roll-off system, at least in the case of the Highlands area, is that it facilitates superior planning and management of collection facilities. If, for example, several (2-3) sites capable of accommodating one or two 40 c.y. containers could be secured in the Highlands area, these sites could then be professionally engineered and landscaped in a comprehensive fashion. Wilson County, North Carolina, for example, has achieved considerable success in creating a park-like setting around its 40 c.y. container sites. Such an approach might be an answer to the constant criticism which the green box system has received in the Highlands area. In order to accomplish this goal, the County would be required to make a relatively long-term commitment to high quality collection sites. Significant costs would be incurred in creating such a site system, but the anticipated increase in public acceptance of the sites would eliminate the pressure to frequently shuffle sites which currently exists with the green box system.

At present, the aggregate (site) capacity of the green box system in the Highlands area is 100 c.y. If the present green boxes were replaced with three 40 c.y. containers, the site capacity would become 120 c.y. Such a capacity would equal the present level as well as provide an excess capacity of 20%. Assuming that the frequency of collection would remain at its present level of three collections per week during the November-April period and seven collections per week during the May-October period, the following would be the total annual costs of operating this system. The collection vehicle would be stationed at a location in the central section of Highlands from which it would initiate its collection route and to which it would return upon finishing its route.

Table 31
40 c.y. Roll Off System to Serve Highlands Area
Annual Cost Estimate*

1)	Vehicle depreciation ($60,000 purchase price over 15 year using straight line method and no salvage value)	$ 4000
2)	Insurance	850
3)	Registration	500
4)	Tires (@ 7 cents per mile)	819
5)	Fuel (@ 1.15 per gallon, 5 mpg)	2691
6)	Maintenance and repair (@ 3.3% of purchase price)	1980
7)	Oil and filters (@ 2 cents per mile; changed approximately every 4000 miles)	234
8)	Grease	72
9)	Transportation for driver off of Route 1 into central section of Highlands (260 trips; 20 miles per trip; 20 cents per mile)	1040
10)	Site development (3 @ $20,000 each depreciated over 20 year period; straight line, no salvage value)	3000
11)	Site maintenance	500
	Total Annual Cost	$15686
	Total Annual Mileage	11700
	Cost Per Mile	$1.341

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*Notes regarding cost estimate for 40 c.y. roll-off system . . .

(a) The preceding cost estimate assumes that there will be no increase in personnel costs as a result of implementing the roll-off system. It should not require any significantly shorter or longer period of time to service the 40 c.y. system as opposed to the green box system, however, this is not known for a fact and should be scrutinized closely if the County should decide in favor of implementing this system.

(b) The annual mileage figure of 11,700 supposes arbitrarily that the three 40 c.y. containers will be located (one each) at or near the present Flat Mountain, NC 28 and Scaly Mountain green box sites. The following route would be followed: Center of

Highlands to Flat Mountain to (Highlands) Landfill to NC 28 to Landfill to Scaly Mountain to Landfill to Center of Highlands = ±45 miles x 260 trips/year = 11,700 miles/year.

(c) For the express purpose of maintaining cost comparability, this estimate does not include the costs of either a) the 40 c.y. containers themselves or b) site acquisition costs. The cost of the containers themselves has been omitted since the cost of purchasing the three 40 c.y. containers (at roughly $4000 each) would approximate the replacement costs of the 23 green boxes now serving the Highlands area. Because the County would incur the costs of providing containers under either system, (eventually via replacement of green boxes, if not presently via acquisition of 40 c.y. containers), the County would not over the long-term experience an actual change in expenses for this line item if it should choose to implement the 40 c.y. system. If the 40 c.y. system were implemented, most of these 23 green boxes could be placed into reserve and used to replace the green boxes which exist in the remainder of the County as the latter begin to wear out . . . therefore, the County would not experience an actual loss in its investment in the 23 green boxes now serving the Highlands area if the roll-off system were implemented.

The cost of site acquisition has been excluded due to the fact that land should either hold its value or steadily appreciate throughout its years of use as a 40 c.y. container site. Since the County could eventually recoup its investment in this land if it so chooses, the County would ultimately incur no expenses for this item. A cost may be incurred if a site is either rented or leased, and in that case should be treated as such.

(d) The cost estimate focuses only upon annual costs. It should be recognized and stressed strongly that, in spite of the fact that the annual costs of the 40 c.y. system may not be drastically greater than those of the current green box system, the initial "start-up" costs of the new system (i.e. acquisition of sites and equipment, site development, etc.) would be great. These relatively non-recurring capital costs may place a severe strain on the County's budget, especially if incurred over a short time span.

(e) The cost estimate proposes that only one 40 c.y. collection vehicle be purchased. In reality this may not be practical since, in the absence of the capability to service 40 c.y. containers elsewhere in the County, there would be no back-up capacity provided. The County would, as a practical matter, not wish to operate such a system. If the one 40 c.y. collection vehicle were to break down, a solid waste collection crisis situation would rapidly develop.

(f) The assumed site development costs as well as site maintenance costs are crude estimates. Actual costs may be significantly higher or lower depending upon the level and quality of service to be provided as well as the method of labor utilized (i.e. in-house, contracted, volunteer).

Cost of Operating Separate 32 c.y. Front Loading Vehicle (Green Box) System to Serve Highlands Area

A second alternative for establishing an independent Highlands route would center upon placing an older model 32 c.y. front loading vehicle into operation in order to serve the present green box network in the Highlands area. The collection vehicle would be stationed at a location in the central section of Highlands, from which it would initiate its collection route and to which it would return upon finishing the route. This vehicle might be one of the 32 c.y. vehicles which the County has used in past years to serve Routes 1 or 2, or it might be a reconditioned or new vehicle. For the purposes of cost comparison, it should not make a great deal of difference which option is selected. If, for example, it is assumed that the vehicle serving Route 2 (life = 5 years @ 35,000 miles per year . . . see Table 33) were employed for four years on that route and then shifted into service in the Highlands area, the following would be the annual vehicle depreciation costs associated with this vehicle in the Highlands area:

Purchase price	$65,000	
Depreciation over 4 years @ $13,000/year	$52,000	
Cost remaining to be depreciated in Highlands area	$13,000	
Remaining life @ 9880 miles/year in Highlands area (years)	3.45	(35,000 ÷ 9880)
Annual cost per year in Highlands area	$ 3,672	(13,000 ÷ 3.54)

If, on the other hand, a new truck were purchased at a cost of $65,000 (actual cost would be higher, perhaps $75,000-$80,000, but this figure used in order to maintain comparability of estimates; see introduction to this section) and assigned a lifespan of 17.71 years (175,000 ÷ 9880), the cost would be $3670, which for all practical purposes, is identical to that of the older vehicle. Both estimates employ the straight line method and no salvage value.

Table 32
Separate 32 c.y. Front Loading Collection System to Serve Highlands Area
Annual Cost Estimate*

1)	Vehicle depreciation (see previous commentary)	$ 3670
2)	Insurance	850
3)	Registration	500
4)	Tires (@ 8½ cents per mile)	340
5)	Fuel (@ 1.15 per gallon, 4 mpg)	2840
6)	Maintenance and repair (@ 3.4% of purchase price)	2210
7)	Oil and filters (@ 2½ cents per mile; changed approximately every 4000 miles)	247
8)	Grease	61
9)	Transportation for driver off of Route 1 into central section of Highlands (260 trips; 20 miles per trip; 20 cents per mile)	1040
	Total Annual Costs	$12258
	Total Annual Mileage	9880
	Cost Per Mile	$1.241

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*Notes regarding cost estimate for separate 32 c.y. vehicle system . . .

As with the 40 c.y. roll-off system, it is assumed that no additional labor costs will be incurred by the County, but this factor should be examined carefully if the County should choose to implement this alternative. There may be some large initial "start-up" costs with the 32 c.y. system as well, depending upon the manner in which it would be placed into operation (new versus old vehicle, etc.). The mileage figure of 9880 assumes that the vehicle would start its collection route in the central section of Highlands, service the six green box sites, and return to its starting point = ±38 miles x 260 trips/year = 9880 miles/year.

Other Alternatives for Serving the Highlands Area

There exist several alternatives for servicing the Highlands area other than those detailed in this study. The County may wish, for example, to contract with a second party to perform this service. In order to be cost-effective, such a contract could not exceed the cost savings which the County would experience by eliminating service to the Highlands area, that is, $6214 annually. Yet another alternative would be the addition of 40 c.y. roll-off collection capacity to the green box collection system which currently forms Route 1, thereby creating a sort of hybrid route composed of both roll-off containers (in the Highlands area) and green boxes (in all other areas). Collection vehicles equipped to handle this function are available on the market (estimated current capital cost = $100,000), however, it would be very difficult to prepare an annual cost estimate for such a system due to the complications encountered in determining the logistics of collection routing, trips to a landfill, etc. Such a system should be kept in mind as an alternative, but should be approached very cautiously.

Summary

The County would save $6214 annually if it eliminated the Highlands area from its present routing structure, but would then be required to find an alternative means of servicing the Highlands area. It would cost the County $15,686 annually to implement a 40 c.y. roll-off system and $12,258 annually to implement a separate 32 c.y. front-loading system. It is therefore clear that neither of these two major alternatives would be cost-effective . . . justification from a cost-benefit standpoint could be made only if tremendous benefits could be assigned to factors such as reduced safety hazards and/or improved aesthetics.

4) Servicing the Nantahala Area

The Nantahala area consists of the six green box sites located in the extreme northwestern section of the County. This area is very isolated but is experiencing an increase in demand for solid waste collection service. The efficient scheduling of collection trips to the Nantahala area is especially important to the County due to the fact that an unbroken (no green box sites) expanse of 22 miles is encountered prior to servicing the first Nantahala green box site and a similar 26 mile stretch is encountered following the sixth stop. The total trip to Nantahala measured from the point of departure off of the main route to the point of resumption of the main route encompasses about 79 miles. At present, this trip is made twice weekly and is a part of Route 2.

By increasing the site capacity within the Nantahala area to roughly two and one-half times its current size of 68 cubic yards, collection frequency could be reduced to once weekly. In order to produce the additional 102 c.y. of site capacity, 17 additional 6 c.y. containers would be required. Assuming that no modifications to the sites themselves would be necessitated in order to accommodate these containers, the capital cost of adding this capacity would be $7650 (@ $450 per container).

The cost of operating Route 2 as it is currently structured shall now be compared with the cost of operating Route 2 minus one weekly Nantahala run in order to determine whether it would be cost-effective to add the extra site capacity.

Cost of Operating Route 2 as It Now Exists

Table 33
Collection Vehicle to Serve Route 2
Annual Cost Estimate

1) Vehicle depreciation ($65,000 purchase price over 5 years using straight line method and no salvage value)	$13000
2) Insurance	850
3) Registration	500
4) Tires (@ 8½ cents per mile)	2975
5) Fuel (@ 1.15 per gallon; 4 mpg)	10062
6) Maintenance and repair (@ 12% of purchase price)	7800
7) Oil and filters (@ 2½ cents per mile; changed approximately every 4000 miles)	875
8) Grease	216
Total Annual Costs	$36278
Total Annual Mileage	35000
Cost Per Mile	$1.037

Cost of Operating Route 2 Exclusive of One Weekly Nantahala Trip

The actual mileage saved by eliminating one Nantahala trip per week will depend upon the manner in which the remainder of the route is restructured. If it is assumed arbitrarily that 60 of the total 79 miles were eliminated, then an annual reduction of 3120 (60 x 52 weeks) miles would occur.

Table 34
Collection Vehicle to Serve Route 2 less One Weekly Nantahala Trip
Annual Cost Estimate

1) Vehicle depreciation ($65,000 purchase price over 5½ years using straight line method and no salvage value)	$11818
2) Insurance	850
3) Registration	500
4) Tires (@ 3½ cents per mile)	2710
5) Fuel (@ 1.15 per gallon; 4 mpg)	9165
6) Maintenance and repair (@ 11% of purchase price)	7150
7) Oil and filters (@ 2½ cents per mile; changed approximately every 4000 miles)	797
8) Grease	197
Total Annual Costs	$33187
Total Annual Mileage	31880
Cost Per Mile	$1.041

Cost Savings Resulting from Elimination of One Weekly Nantahala Trip and Conclusion

Therefore, the annual cost savings which would accrue to the County as a result of eliminating one weekly Nantahala trip would be $3091, illustrated as follows:

$36278	Route 2
33187	Route 2 less one weekly Nantahala trip
$ 3091	

The cost of adding the extra green box capacity would be $7650. Therefore, the County could recoup its investment in the additional green boxes within about two and one-half years ($7650 ÷ $3091 = 2.48) by virtue of reducing collection frequency in the Nantahala area.

CHAPTER FIVE
IMPLEMENTATION

The measures (i.e. recommendations and alternatives) which have been outlined in this study as potential solutions to identified problems can be further grouped into two categories:

1) Independent--These measures should be able to be implemented immediately since factors such as timing and/or ripple effects on other components of the solid waste management system are not especially critical to their effective implementation. Examples of "independent" measures might include the institution of a system for separate accounting of collection and disposal costs, or perhaps the consolidation of the Jones Creek and Allison Creek green box sites.

2) Dependent--Considerable complexity is involved in determining whether these measures should be implemented and, if so, when. Timing, ripple effects on other components of the solid waste management system, the necessity for increased input from the public as well as policy makers, etc. are very critical to their effective implementation. An example of a "dependent" measure is the choice of a collection system to serve the Highlands area. The chosen course of action will hinge upon the outcome of the Highlands annexation issue, it will dictate whether it will be necessary to undertake certain improvements to the green box system in the Highlands area, it may impact the work schedule, and it will undoubtedly require a closer examination by both the County administration and public.

The examples listed above are measures which can, at this point, be confidently classified into one of the two categories. In many cases, classification will not be as simple, since a measure which is seemingly independent may depend upon the resolution of another issue before it can be effectively implemented. The decision to expand the site capacity of certain sites may, for example, need to be preceded by a decision regarding the proposed work schedule . . . if Sunday collection service is eliminated, site expansion plans should then be scrutinized in greater detail.'

The essential point of this discussion is that, due to these complexities, it would be very difficult for a path of implementation activities to be documented in this study at this time. The County should examine the list of recommendations and alternatives outlined in the study and, based upon its knowledge of its overall solid waste management system, group each of the measures into either the independent or dependent category. The resolution of certain key issues (e.g. the Highlands annexation) will then enable the County to narrow the scope of its decision-making process and will in turn propel the study one step closer to the plotting of a path of implementation activities. During the interim period, the County is urged to feel free to contact the Division of Community Assistance in order to secure ongoing technical assistance (at no charge) with the implementation of this study. Once certain key issues are resolved, the Division of Community Assistance will then also be available to assist the County in documenting a path of implementation activities.

APPENDICES

APPLICABLE FEDERAL AND STATE LEGISLATION/REGULATIONS

This section shall briefly examine some of the more important pieces of governmental legislation and regulations which affect solid waste management. The reader who wishes to gain a more thorough understanding of the legislation and regulations listed below is urged to use the listing only as a guide to a more detailed level of information available from the specific Federal or State agency issuing such information.

Federal

Perhaps the most significant Federal legislation related to solid waste management is the "Resource Conservation and Recovery Act of 1976" (Public Law 94-580) which became effective October 21, 1976. This Act amended the Solid Waste Disposal Act of 1965 (PL 89-272) which had earlier been amended by the Resource Recovery Act of 1970 (PL 91-512). A major concern of the 1976 Act is the "management of solid waste disposal and hazardous wastes together with development of resource recovery systems". The stated objectives of the 1976 Act are "to promote the protection of health and the environment and to conserve valuable material and energy resources by:

1- Providing technical and financial assistance to State and local governments and interstate agencies for the development of solid waste management plans.

2- Providing training grants in solid waste occupations.

3- Prohibiting future open dumping and requiring the conversion of existing open dumps.

4- Regulating the treatment, storage, transportation and disposal of hazardous wastes.

5- Providing for the promulgation of guidelines for solid waste management practices and systems.

6- Conducting a research and development program for improved solid waste management and resource conservation techniques.

7- Demonstrating improved solid waste management and resource conservation and recovery systems.

8- Establishing a cooperative effort among Federal, State and local governments and private enterprise in order to recover valuable materials and energy from solid waste.

As the situation presently exists, the collection, disposal, and overall management of solid waste within the jurisdiction covered by this study will not be affected significantly by the Resource Conservation and Recovery Act of 1976. The Act does not impose excessive regulations upon sanitary landfills which are managed properly. The Act does address items such as the distinction between sanitary landfills and open dumps; regulation of the flow of hazardous wastes; and development of solid waste management plans. It is possible that the Act will affect the jurisdiction covered by this study via State and/or regional comprehensive solid waste handling plans (which are provided for in the Act) which would be required to include the following items in order to be approved: a prohibition on establishment of new open dumps and a requirement that all discarded materials be disposed of at either a resource recovery facility, an approved sanitary landfill, or another environmentally sound manner; a plan to close or upgrade all existing open dumps; and establishment of regulatory powers to carry out the plan.

State

Chapter 130 of the North Carolina General Statutes is entitled "Public Health"; Article 13B of this chapter is entitled "Solid Waste Disposal" and establishes the foundation for the governance of solid waste disposal in North Carolina. Among other things, Article 13B defines terms such as garbage, refuse, solid waste, solid waste disposal, solid waste disposal facility, and solid waste disposal site, and designates the Department of Human Resources as the "single agency for the State for the purposes of the Federal Solid Wastes Disposal Act (PL 89-272) and for the purpose of such other State or Federal legislation as has or may hereafter be enacted to assist in the proper disposal of solid waste". The Article also establishes a unit within the

Department of Human Resources "to promote sanitary disposal of solid waste ... and retain such qualified personnel as may be necessary". That unit presently exists in the form of the Solid Waste and Vector Control Branch of the Division of Health Services of the Department of Human Resources. The Solid Waste and Vector Control Branch is based in Raleigh and maintains a field office in Black Mountain. The basic program carried out by this agency is perhaps best described in General Statute 130-166.18:

> The Department of Human Resources is authorized and directed to engage in research, conduct investigations and surveys, make inspections, and establish a statewide solid waste disposal program. In establishing a program, the Department will have authority to:
>
> (1) Develop a comprehensive program for implementation of safe and sanitary practices for disposal of solid waste throughout the State; and
>
> (2) Advise, consult, cooperate, and contrast with other agencies and units of State and local governments, the Federal government, and industries and individuals in the formulation and carrying out of a solid waste disposal program.
>
> The Commission shall have authority to provide standards for the establishment, location, operation, maintenance, use and discontinuance of solid waste disposal sites and facilities. Such standards shall be designed to accomplish the maintenance of safe and sanitary conditions in and around solid waste disposal sites and facilities, and shall be based on recognized public health practices and procedures, sanitary engineering research and studies, and current technological development in equipment and methods. Such standards shall not apply to the disposal of solid waste accumulated by an individual or individual family or household unit and disposed of on his own property.

"Solid Waste Management Rules", the most recent version of which is dated February 1, 1976, has been prepared in order to implement Article 13B. These implementing rules contain such items as procedures and requirements for establishment of sanitary landfill sites; detailed operational requirements for sanitary landfills, as well as generalized requirements for the operation of management facilities such as transfer stations; rules governing the storage, collection, and transportation of solid waste as well as the operation of incinerators; and several other items. General Statute 130-17 provides the statutory authority

for the solid waste management rule entitled "Limitations" which states that "Nothing in these rules shall be construed to limit the authority of municipal and county governments or sanitary districts from adopting more stringent solid waste disposal requirements than those set forth in these rules". The "Solid Waste Management Rules" provide the basic framework within which existing landfills must operate and within which proposed transfer stations and/or landfills must comply in order to become operational.

(County Level State Legislation)

Chapter 153A of the North Carolina General Statutes deals generally with county-level government. Article 15 of this Chapter is entitled "Public Enterprises" and grants authority to counties to "acquire, lease as lessor or lessee, construct, establish, enlarge, improve, extend, maintain, own, operate, and contract for the operation of public enterprises in order to furnish services to the county and its citizens. A county may acquire, construct, establish, enlarge, improve, maintain, own and operate outside its borders any public enterprise. A county may by ordinance or resolution adopt adequate and reasonable rules and regulations to protect and regulate a public enterprise belonging to or operated by it". Included in the listing of public facilities are "solid waste collection and disposal systems and facilities". In addition to Part 1 of Article 15 which is labeled "General Provisions", Part 3 of the same contains "Special Provisions for Solid Waste Collection and Disposal" which provides a significant amount of detailed legislation related to county-level solid waste collection and disposal. Noteworthy is a clause which states that "no county shall be authorized by this Article to levy a disposal fee upon any municipality located in that county if the Board of Commissioners levy a countywide tax on property which provides in part for financing such disposal facilites".

Article 6 of Chapter 153A is entitled "Delegation and Exercise of the General Police Power". Section 153A-136 establishes the county's power to "...by ordinance regulate the storage, collection, transportation, use, disposal, and other disposition of solid wastes". Included is the enabling legislation for counties to grant franchises to private haulers, to regulate their routes, to define franchised areas, and to generally regulate the activities of persons, firms, and corporations (dealing with solid waste) both public and private. (The same authority to regulate private haulers was formerly provided under Article 22 of Chapter 153). General Statute 153A-132.1 of Article 6 provides for the removal and disposal of trash, garbage, etc. at the county level and reads as follows:

> The Board of County Commissioners of any county is hereby authorized to enact ordinances governing the removal, method or manner of disposal, depositing or dumping of any trash, debris, garbage, litter, discarded cans or receptacles or any waste matter whatsoever within the rural areas of the county and outside and beyond the corporate limits of any municipality of said county. An ordinance adopted pursuant hereto may make it unlawful to place, discard, dispose, leave or dump any trash, debris, garbage, litter, discarded cans or receptacles or any waste matter whatsoever upon a street or highway located within that county or upon property owned or operated by the county unless such trash, debris, garbage, litter, discarded cans or receptacles or any waste matter is placed in a designated location or container for removal by a specific garbage or trash service collector.
>
> Boards of County Commissioners may also provide by ordinance enacted pursuant to this section, that the placing, discarding, disposing, leaving or dumping of the articles forbidden by this section shall, for each day or portion thereof the articles or matter are left, constitute a separate offense, and that a person in violation of the ordinance may be punished by a fine not exceeding fifty dollars ($50.00) or imprisoned not exceeding 30 days or both, for each offense.

(Municipal Level State Legislation)

Chapter 160A of the General Statutes relates to municipal government; Article 16 is entitled "Public Enterprises" and lists "solid waste collection and disposal systems and facilities" as such an enterprise. The authority

to operate solid waste collection and disposal systems by municipalities is analogous to that for counties. It should be noted that "...a city may extend and operate any public enterprise outside its corporate limits within reasonable limitations...". Section 160A-192 of Article 8 states that "a City may by ordinance regulate the disposal of solid wastes within the City and may require the owners or occupants of houses and other buildings to place solid waste in specified places or receptacles for the convenience of City collection and disposal and may impose charges for such collection and disposal".

General Statute 160A-303.1 further clarifies a municipality's authority to regulate the placing of trash, refuse, and garbage within municipal limits by stating:

> The governing body of any municipality is hereby authorized to enact an ordinance prohibiting the placing, discarding, disposing or leaving of any trash, refuse or garbage upon a street or highway located within that municipality or upon property owned or operated by the municipality unless such garbage, refuse or trash is placed in a designated location or container for removal by a specific garbage or trash service collector. Any ordinance adopted pursuant hereto may prohibit the placing, discarding, disposing or leaving of any trash, refuse or garbage upon private property located within the municipality without the consent of the owner, occupant, or lessee thereof and may provide that the placing, discarding, disposing or leaving of the articles forbidden by this section shall, for each day or portion thereof the articles or matter are left, constitute a separate offense.
>
> The governing body of a municipality, in any ordinance adopted pursuant hereto, may provide that a person who violates the ordinance may be punished by a fine not exceeding fifty dollars ($50.00) or imprisoned not exceeding 30 days, or both, for each offense.

(County and Municipal Level State Legislation)

Authority to remove and dispose of junked and abandoned automobiles is granted to counties under General Statute 153A-132 and for municipalities under General Statute 160A-303.

General Statute 14-399, a section of the Criminal Code, outlaws littering within the State and its waters. It should be noted that when litter is <u>blown</u> from a vehicle, the operator shall be presumed to have committed an offense.

G. S. 136-18.3 authorizes the N. C. Department of Transportation "to issue permits to counties and municipalities for the location of containers on rights-of-way of state-maintained highways for the collection of garbage".

SOLID WASTE MANAGEMENT RULES

Prepared by the Department of Human Resources
Division of Health Services
Environmental Health Section
Solid & Hazardous Waste Management Branch

Recodified February 1, 1976

Amended Effective April 15, 1979

#411

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SUBCHAPTER 10C - SOLID AND HAZARDOUS WASTE MANAGEMENT BRANCH

Regulations 10 NCAC 10C .0101 - .0106 and .0108 - .0118; SOLID WASTE MANAGEMENT; have been amended to read as follows:

.0101 DEFINITIONS

As used in this section, the term:

(1) "Cell" means compacted solid waste completely enveloped by a compacted cover material.

(2) "Disposal" means the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste into or on any land so that such solid waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any water, including groundwaters.

(3) "Division of Health Services" means the director of the division of health services or his authorized representative.

(4) "Floodplain" means the lowland and relatively flat areas subject to a one percent or greater chance of flooding in any given year.

(5) "Garbage" means all putrescible wastes, including animal offal and carcasses, and recognizable industrial by-products, but excluding sewage and human waste.

(6) "Hazardous waste" means a solid waste, or combination of solid wastes, which because of its quantity, concentration, or potential, chemical or infectious characteristics may:

(a) cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or

(b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

(7) Incineration" means the process of burning solid, semi-solid or gaseous combustible wastes to an inoffensive gas and a residue containing little or no combustible material.

(8) "Open burning" means any fire wherein the products of combustion are emitted directly into the outdoor atmosphere and are not directed thereto through a stack or chimney, incinerator, or other similar devices.

(9) "Open dump" means a solid waste disposal site which is not a sanitary landfill or an incinerator.

(10) "Person" means an individual, corporation, company, association, partnership, unit of local government, or other legal entity.

(11) "Putrescible" means solid waste capable of being decomposed by microorganisms with sufficient rapidity as to cause nuisances from odors and gases, such as kitchen wastes, offal and carcasses.
(12) "Radioactive waste material" means any waste containing radioactive material as defined in G.S. 104E-S (14).
(13) "Recycling" means the process by which recovered resources are transformed into new products in such a manner that the original products lose their identity.
(14) "Refuse" means all non-putrescible waste.
(15) "Resource recovery" means the process of obtaining material or energy resources from discarded solid waste which no longer has any useful life in its present form and preparing such solid waste for recycling.
(16) "Runoff" means the portion of precipitation that drains from an area as surface flow.
(17) "Sanitary landfill" means a facility for disposal of solid waste on land in a sanitary manner in accordance with Article 13B of Chapter 130 and this section.
(18) "Sediment" means solid particulate matter both mineral and organic, that has been or is being transported by water, air, gravity, or ice from its site of origin.
(19) "Siltation" means sediment resulting from accelerated erosion which is settleable or removable by properly designed, constructed, and maintained control measures and which has been transported from its point of origin within the site land-disturbing activity and which has been deposited, or is in suspension in water.
(20) "Sludge" means any solid, semisolid or liquid waste generated from a municipal, commercial, institutional, or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility or any other such waste having similar characteristics and effect.
(21) "Solid waste" means any hazardous or non-hazardous garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, institutional, commercial, and agricultural operations, and from community activities. Such term does not include:
(a) fowl and animal fecal waste;
(b) solid or dissolved material in
I. domestic sewage and sludges generated by the treatment thereof in sanitary sewage disposal systems which have a design capacity of more

than 3000 gallons or which discharge effluents to the surface waters;
II. irrigation return flows; and
III. wastewater discharges and the sludges incidental thereto and generated by the treatment thereof which are point sources subject to permits granted under Section 402 of the Federal Water Pollution Control Act, as amended (PL 92-500), and permits granted under G.S. 143-215.1 by the Environmental Management Commission; or

(c) oils and other liquid hydrocarbons controlled under Article 21A of Chapter 143 of the North Carolina General Statutes;

(d) any radioactive material as defined by the North Carolina Radiation Protection Act, G.S. 104E-1 through G.S. 104E-23; or

(e) mining refuse covered by the North Carolina Mining Act, G.S. 74-46 through G.S. 74-68, and regulated by the North Carolina Mining Commission (as defined under G.S. 143B-290).

(22) "Solid waste collector" means any person who collects or transports solid waste.

(23) "Solid waste disposal facility" means land, personnel, equipment, or other resources used in the disposal of solid wastes.

(24) "Solid waste disposal site" means any place at which solid wastes are disposed of by incineration, sanitary landfill or any other method.

(25) "Solid waste generation" means the act or process of producing solid waste.

(26) "Solid waste management" means purposeful, systematic control of the generation, storage, collection, transport, separation, treatment, processing, recycling, recovery and disposal of solid waste.

(27) "Solid waste management facility" means land, personnel, and equipment used in the management of solid waste.

(28) "Spoiled food" means any food which has been removed from sale by the United States Department of Agriculture, North Carolina Department of Agriculture, Food and Drug Administration, or any other regulatory agency having jurisdiction in determining that food is unfit for consumption.

(29) "Storage" means the containment of solid waste, either on a temporary basis or for a period of years, in such a manner as not to constitute disposal.

(30) "Treatment" means any method, technique, or process, including neutralization, designed to change the physical,

chemical, or biological character or composition of any solid waste so as to neutralize such waste or so as to render such waste non-hazardous, safer for transport, amenable for recovery, amenable for storage, or reduced in volume. Such term includes any activity or processing designed to change the physical form or chemical composition of solid waste so as to render it non-hazardous.

(31) "Unit of local government" means a county, city, consolidated city-county, sanitary district, or other local political subdivision, authority or agency of local government.

(32) "Vector" means a carrier, usually an arthropod, that is capable of transmitting a pathogen from one organism to another.

(33) "Water supply watershed" means an area from which water drains to a point or impoundment, and the water is then used as a source for a public water supply.

(34) "Water table" means the upper limit of the portion of the ground wholly saturated with water.

(35) "Working face" means that portion of the land disposal site where solid wastes are discharged, spread, and compacted prior to the placement of cover material.

History Note: Statutory Authority G.S. 130-166.16; 130-166.18;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0102 APPLICABILITY

These solid waste disposal rules are for general application throughout the State of North Carolina unless otherwise specifically indicated by their context. The official policy and purpose of the State of North Carolina in regard to solid waste control is set forth in Article 13B of Chapter 130.

History Note: Statutory Authority G.S. 130-166.18;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0103 GENERAL CONDITIONS

(a) All solid waste shall be stored, collected, transported, separated, processed, recycled, recovered, and disposed of in a manner consistent with the requirements of these rules. The division of health services is responsible for the enforcement of these rules and encourages cooperation from the individuals, municipalities, county governments, sanitary and regional districts, and private enterprise.

(b) No radioactive waste material shall be collected and transported, stored, treated, processed, disposed of or reclaimed, except as specifically authorized by a radioactive material license issued by the division of facility services, Department of Human Resources.

(c) These rules shall not apply to the disposal of solid waste accumulated by an individual or individual family or household unit and disposed of on his own property. Authority for regulation of these wastes lies with boards of county commissioners, cities and towns, and local boards of health.

(d) Hazardous waste shall only be disposed of at a solid waste disposal facility which is permitted to receive the specific hazardous waste or which is authorized specifically to receive the hazardous waste pursuant to Rule .0115 (16) of this Subchapter.

(e) Prior to issue of a permit for a solid waste facility, a written statement from the North Carolina Sedimentation Control Commission stating that the sedimentation control plan has been approved, must be received.

History Note: Statutory Authority G.S. 130-166.18;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0104 SOLID WASTE STORAGE

(a) The owner or occupant of any property, except that exempted as specified in Rule .0103 (c) of this Subchapter shall be responsible for the sanitary storage of all solid waste accumulated on the property.

(b) Garbage shall be stored in either durable rust resistant, non-absorbent, water-tight, rodent proof, and easily cleanable containers with a close fitting fly-tight cover, when applicable, and with adequate handles or bails to facilitate handling, if needed, or other types of containers acceptable to the local governing agency and conforming to the intent of this section.

(c) Refuse shall be stored in durable containers or as otherwise provided in this section. Where garbage is stored in combination with refuse, containers shall meet the requirements for garbage containers.

(d) Hazardous waste shall be stored as prescribed in the applicable state or federal rules.

(e) All containers for the storage of solid waste shall be maintained in such a manner as to prevent the creation of a nuisance or insanitary conditions. Containers that are broken or otherwise fail to meet this rule shall be replaced with acceptable containers. Refuse too large or otherwise not suitable for storage in containers shall be stored in a nuisance free manner consistent with requirements with the unit of local government.

History Note: Statutory Authority G.S. 130-166.18;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0105 COLLECTION AND TRANSPORTATION OF SOLID WASTE

(a) The solid waste collector shall be responsible for the satisfactory collection and transportation of all solid waste to a permitted disposal site or facility.

(b) The solid waste collector shall transport to a site or facility only those solid wastes which the site or facility is permitted to receive.

(c) Vehicles or containers used for the collection and transportation of garbage, or refuse containing garbage, shall be covered, leakproof, durable, and of easily cleanable construction. These shall be cleaned as often as necessary to prevent a nuisance or insect breeding and shall be maintained in good repair.

(d) Vehicles or containers used for the collection and transportation of any solid waste shall be loaded and moved in such a manner that the contents will not fall, leak, or spill and shall be covered when necessary to prevent blowing of material. If spillage should occur, the material shall be picked up immediately by the solid waste collector and returned to the vehicle or container and the area properly cleaned.

History Note: Statutory Authority G.S. 130-166.18;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0106 SOLID WASTE MANAGEMENT FACILITIES

All solid waste management facilities shall be operated in conformity with these rules and in such a manner as to prevent the creation of a nuisance, insanitary conditions, or potential public health hazard.

History Note: Statutory Authority G. S. 130-166.18;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0107 DISPOSAL OF SOLID WASTE

The disposal of solid waste shall be by the following approved methods or any combination thereof:

(1) Sanitary landfill;
(2) Approved incinerator; or,
(3) Disposal by other sanitary methods which may be developed and demonstrated to be capable of fulfilling the basic requirements of these rules and which have been approved by the division of health services.

History Note: Statutory Authority G.S. 130-166.18;
Eff. February 1, 1976.

.0108 PERMITS REQUIRED

(a) No person shall establish a solid waste disposal facility without first obtaining a permit from the division of health services.

(b) A permit to operate a solid waste disposal facility shall be issued by the division of health services after site and operational plans have been approved and it has been determined that the facility can be operated in accordance with this section so as to provide reasonable protection to the ground and surface water as well as the public health.

History Note: Statutory Authority G.S. 130-166.18;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0109 INFORMATION FOR SOLID WASTE DISPOSAL SITE APPROVAL

For review and approval, four copies of the following information shall be presented to the division of health services for each proposed solid waste disposal site except for incineration operation sites. Additional copies may be required upon request of the division of health services.

(1) Map or aerial photograph of sufficient scale to provide the following:
    (1) Entire property owned or leased by the person proposing the disposal site;
    (2) Land use and zoning within one-fourth mile of the disposal site;
    (3) Location of all homes, industrial buildings, public or private utilities, and roads; and,
    (4) Location of wells, watercourses, dry runs, rock outcroppings and other applicable details regarding the general topography.
(2) Soil borings and other data which shall provide sufficient information for an evaluation of subsurface conditions that exist at the site. The data shall include:
    (a) The results of sufficient soil borings to provide geological data of the area planned for the proposed sanitary landfill. Solid borings shall be accurately plotted relative to the boundaries of the proposed operational area.
    (b) A reference to the location of a bench mark that will not be destroyed during landfill development. From the bench mark, the ground elevation of each individual boring shall be determined and plotted.

(c) The results of soil borings that extend ten feet below the lowest proposed excavation and one boring at the lowest elevation of the planned operational area. The number of borings to be dictated by soil conditions.
(d) A log of the soil borings in order that soil types and classifications can be determined and boring profiles plotted that will coincide with operational cross-sectional drawings as much as possible.
(e) Groundwater elevations at the time of boring and 24 hours later along with other pertinent geological information.
(f) A geologic report concerning solution features, landslides, creep, other slope unstability, or other geologic hazards which may be associated with the site when needed.
(g) Analysis of the ground water to depict the natural quality of the groundwater of the proposed disposal site area.

When the cover or liner material is to be obtained from sources other than the proposed disposal site, information from soil borings shall be provided, if necessary, showing the subsurface conditions of borrow areas.

(3) Soil classifications which shall be made by the use of the Unified Soil Classification System, the U. S. Department of Agriculture Classification, American Association of State Highway officials, or other available systems that provide an adequate soil classification.
(4) Location of wells, floodplains, watercourses, dry runs, rock out croppings and other applicable details regarding the general topography.
(5) An approval letter from the unit of local government having zoning authority over the area where the site is to be located if request for approval is submitted by a private person.
(6) Any other information pertinent to the proposed site.

History Note: Statutory Authority G. S. 130-166.18;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0110 INFORMATION FOR OPERATIONAL PLAN APPROVAL

For review and approval four sets of the operational plans for a solid waste disposal facility, except for an incinerator operation, shall be submitted to the division of health services and shall include:

(1) A plot plan of the proposed site showing dimensions, entrance, access roads, proposed landfilling limits and buffer zone.
(2) The location of existing utilities and structures.
(3) Contour maps of the original topography on a scale no greater than 200 feet per inch and five-foot contours.
(4) Sufficient cross-sectional drawings or contour maps so that the proposed finished elevations of the filled area can be accurately determined. Cross-section drawings showing original elevations, the proposed excavation depths, and depths to the water table, if encountered.
(5) The location of proposed utilities, on-site structures for equipment storage or employee usage, and weighing facilities, if planned.
(6) The proposed method of landfilling, such as trenching, ramping and diking, or area filling.
(7) Provisions for controlling of fill slopes on the outer face of peripheral dikes and face of the finished sanitary landfill.
(8) Provisions for controlling erosion shall be provided for all land-disturbing activities and following completion of any phase of grading, ground cover shall be provided to prevent accelerated erosion.
(9) Procedures for promoting vegetative growth as soon as possible on all completed areas.
(10) Indication of sufficient buffer width along man-made or natural watercourses to confine visible siltation within one-fourth of the buffer zone.
(11) Measures, structures, and devices designed and to be constructed so as to provide effective control for calculated peak rate of runoff from such storm frequency as indicated by the degree of protection needed in the design area to prevent any off-site siltation.
(12) A description of the landfill site that would be sufficient as a description in an instrument of conveyance.
(13) Number and location of groundwater monitoring wells when required.

History Note: Statutory Authority G.S. 130-166.18;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0111 MONITORING REQUIREMENTS
(1) Surface waters
(a) All streams on site shall be monitored prior to receiving of any waste and at least annually.

(b) If there are no on site streams, the receiving stream for surface runoff from the site shall be monitored prior to receiving any waste and at least annually.

(2) Groundwater monitoring wells will be required for the following sites:
(a) Those with marginal soil permeability characteristics.
(b) Those with shallow soil depth to bedrock.
(c) All other sites deemed necessary from good engineering practices.

History Note: Statutory Authority G.S. 130-166.18;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0112 REPORT

A report shall accompany the plans indicating the following:
(1) Population and area expected to be served by the proposed site.
(2) Anticipated type, quantity, and source of material to be disposed of at the site.
(3) Type and number of pieces of equipment to be provided at site for excavating, earth moving, spreading, compacting, covering, and other needs.
(4) Name of individual responsible for operation and maintenance of the site.
(5) Projected use of land after completion of the sanitary landfill.
(6) Anticipated lifetime of project.
(7) Description of systematic usage of area, operation, orderly development and completion of the sanitary landfill.
(8) Any other information pertinent to the proposed operational plan.

History Note: Statutory Authority G.S. 130-166.18;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0113 DENIAL

(a) Upon receipt of the request for site and operational plan approval, the division of health services shall review the request to assure that all provisions of these rules will be met and that proposed site, facilities and operations will comply with other applicable laws and rules. Based on its review, the division of health services shall either approve or deny the request in writing.

(b) When a request for approval is denied, the person shall be notified in writing of the reasons therefore. A denial shall be

without prejudice to the person's right to a hearing or for filing a future request after revisions are made to meet objections specified as reasons for denial.

(c) The reasons for denial are:
  (1) Submission of incomplete information;
  (2) Unsuitable soils;
  (3) Rock formations, water table, or saturation zone near the surface;
  (4) Insufficient amount of cover material;
  (5) Possibility of contaminating adjacent water supplies;
  (6) Site located in floodplain area;
  (7) Inadequate operational plans;
  (8) Possibility of contravention of assigned stream water quality;
  (9) Any other reasons which would prevent the solid waste facility or site from being operated in accordance with Article 13B, Chapter 130 of the General Statutes, these rules, or acceptable engineering or public health standards.

History Note: Statutory Authority G.S. 130-166.18;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0114 SITE ACCEPTANCE CONDITIONS

Prior to receiving solid waste on any new site, the following requirements shall be met:
(1) Recordation of the permit as described in G.S. 130-166.21;
(2) Site preparation shall be completed according to approved operational plan;
(3) An inspection shall be made by a representative of the division of health services.

History Note: Statutory Authority G. S. 130-166.18;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0115 OPERATIONAL REQUIREMENTS FOR SANITARY LANDFILLS

Any person who maintains or operates a sanitary landfill site shall maintain and operate the site in conformance with the following practices unless otherwise allowed by the division of health services in granting the required approval:
(1) Operational plans shall be approved and followed, including monitoring and reporting requirements specified for the site.

(2) Solid waste shall be restricted to the smallest area feasible and compacted as densely as practical into cells. A proper slope on the working face shall be maintained.
(3) Solid waste shall be covered after each day of operation, or as specified by the division of health services, with a compacted layer of at least six inches of suitable cover.
(4) Within one month after final termination of disposal operations at the site or a major part thereof or upon revocation of a permit, the area shall be covered with at least two feet of suitable compacted earth adequately sloped to allow surface water runoff in a controlled manner without excessive on-site erosion and off-site siltation. The division of health services may require further action to be taken in order to correct any condition which is or may become injurious to the public health.
(5) The finished surface of the filled area shall be seeded with native grasses or other suitable vegetation immediately upon completion or as soon as practical but no later than thirty working days. If necessary, seeded slopes shall be covered with straw or similar material to prevent erosion.
(6) Adequate on-site erosion control measures shall be practiced.
(7) No off-site siltation will be allowed.
(8) An attendant shall be on duty at the site at all times while it is open for public use to assure compliance with operational requirements and to prevent the entrance of hazardous waste onto the site.
(9) The approach road to the site shall be of all-weather construction and maintained in good condition.
(10) Dust control measures shall be implemented where necessary.
(11) Surface water shall be diverted from the operational area.
(12) Solid waste shall not be disposed of in water.
(13) Open burning of solid waste is prohibited.
(14) Equipment shall be provided to control accidental fires or arrangements shall be made with the local fire protection agency to immediately provide fire-fighting services when needed.
(15) Spoiled foods, animal carcasses, abattoir waste, hatchery waste, and other animal waste delivered to the disposal site shall be kept separate from other solid waste and shall be compacted and covered immediately.
(16) No hazardous or liquid wastes shall be accepted or disposed of in a sanitary landfill except as may be permitted by the division of health services.

(17) Effective vector control measures shall be applied to control files, rodents, and other insects or vermin when necessary.
(18) Appropriate methods such as fencing and diking shall be provided to confine material subject to be blown by the wind within the area. At the conclusion of each day of operation, all windblown material resulting from the operation shall be collected and returned to the area by the owner or operator.
(19) Signs providing information on dumping procedures, the hours during which the site is open for public use, and other pertinent information shall be posted at the site entrance.
(20) Signs shall be posted stating that no hazardous or liquid waste can be received without written permission from the division of health services.
(21) Traffic signs or markers shall be provided as necessary to promote an orderly traffic pattern to and from the discharge area and to maintain efficient operating conditions.
(22) Prior to termination of operation of a sanitary landfill site the division of health services shall be notified in order that a site inspection may be made by the division of health services to determine compliance with closing procedures before earth moving equipment is removed from the property.
(23) Once a solid waste disposal site has been closed in accordance with the requirements of the division of health services, future necessary maintenance shall be the responsibility of the owner.

History Note: Statutory Authority G.S. 130-166.18;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0116 INCINERATOR OPERATION

(a) All incinerators shall be designed and operated in a manner so as to prevent the creation of a nuisance or potential health hazard and must comply with the requirements of Subsection (c) of this Rule and the Rules of the division of environmental management, Department of Natural Resources and Community Development.

(b) Construction of an incinerator shall not be initiated prior to the approval of site plans by the division of health services and the receipt of a permit. Such plans must be accompanied by a written approval of the incinerator from the division of environmental management and by a written statement from the unit

of local government having zoning authority that the proposed incinerator site has been approved.

(c) Each proposed incinerator installation shall be in compliance with the following criteria:

(1) The incinerator plant shall be so situated, equipped, operated, and maintained as to minimize interference with other activities in the area.

(2) All solid waste to be disposed of at the site shall be confined to the dumping area. Adequate storage facilities shall be provided.

(3) Effective vector control measures shall be applied to control flies, rodents, and other insects or vermin.

(4) Equipment shall be provided in the storage and charging areas and elsewhere as needed or as may be required in order to maintain the plant in a sanitary condition.

(5) All residue from the incinerator plant shall be promptly disposed of at an approved sanitary landfill site.

(6) Upon completion of construction of the incinerator facility and prior to initial operation, the division of health services shall be notified in order that an inspection may be made of the facility to determine conformance with the approved plan and with the applicable provisions of these rules.

(d) Major reasons for denial:

(1) Submission of incomplete information;

(2) Lack of air quality permit from the division of environmental management, Department of Natural Resources and Community Development;

(3) Lack of written statement from local unit of government regarding compliance with zoning requirements.

History Note: Statutory Authority G.S. 130-166.18;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0117 VARIANCES

(a) In order to avoid undue hardships, promote the effective and reasonable application and enforcement of these rules, the division of health services may grant variances from the requirements of these rules in accordance with such procedures and conditions as it may prescribe. Each application for variance shall be examined on the basis of conditions prohibiting full compliance.

(b) Variable factors such as population density, daily or seasonal loadings, nature of wastes, location of facility or climate, land use, stream reservoir classification are to be

taken into account in determining the degree of variance, if any, which may be allowed.

(c) When requests for variances involve quantitative values, appropriate agency reviews will be held prior to approving such variances.

History Note: Statutory Authority G.S. 130-166.18;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0118 NONCONFORMING SITES AND FACILITIES

A person operating or having operated an open dump for disposal of solid waste shall immediately convert to a sanitary landfill or close the site in accordance with the following requirements:

(1) Implement effective rat control, including baiting for at least two weeks after closing, to prevent rat migration to adjacent properties.
(2) Compact and cover existing solid waste on-site if suitable. Final cover for the entire area shall be two feet or more of suitable compacted earth.
(3) Remove and place solid waste in a suitable site or facility if present site is not suitable.
(4) Implement erosion control measures by grading and seeding.
(5) Post signs indicating the dump site closure.

History Note: Statutory Authority G.S. 130-166.18;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

SUBCHAPTER 10C - SOLID WASTE AND VECTOR CONTROL

Regulations 10 NCAC 10C .0119 - .0123; SOLID WASTE MANAGEMENT, have been amended to read as follows:

.0119 DEFINITIONS

As used in the following rules, the term:

(1) "Delegate" means any person to whom the Department has delegated authority to act in its stead in relation to civil penalties;
(2) "Hearing Office" means the Department of Human Resources hearing office;
(3) "Respondent" means the person against whom a penalty has been assessed.

History Note: Statutory Authority G.S. 130-166.18;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0120 ADMINISTRATIVE PENALTIES

The following rules provide the procedures and standards governing the assessment, remission, mitigation and appeal of administrative penalties imposed by the Department of Human Resources or its delegates or under the Solid Waste Management Act, Article 13B of Chapter 130 and 10 NCAC 10C .0100.

History Note: Statutory Authority G.S. 130-166.18; 130-166.21E; 130-205;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0121 WHO MAY ASSESS PENALTIES

Administrative penalties may be assessed by the Department or its delegate.

History Note: Statutory Authority G. S. 130-166.18; 130-166.21E; 130-205;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0122 WHEN PENALTIES MAY BE ASSESSED

Administrative penalties may be assessed against any person for violations as prescribed in G.S. 130-166.21E(a).

History Note: Statutory Authority G.S. 130-166.18;
130-166.21E; 130-205;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

.0123 AMOUNT OF PENALTY ASSESSMENT

(a) An administrative penalty is not to exceed the amount which may be assessed for violations as prescribed in G.S. 130-166.21E(a) involving non-hazardous wastes.

(b) An administrative penalty is not to exceed the amount which may be assessed for violations as prescribed in G.S. 130-166.21E(a) involving hazardous wastes.

(c) Each day of a continuing violation shall constitute a separate violation.

(d) Each violation of a specific provision of Article 13B of Chapter 130, the rules issued thereunder, and any order pursuant thereto, shall be a separate violation.

History Note: Statutory Authority G.S. 130-166.18;
130-166.21E; 130-205;
Eff. February 1, 1976;
Amended Eff. April 15, 1979.

SUBCHAPTER 10C - SOLID WASTE AND VECTOR CONTROL

Regulations 10 NCAC 10C .0124 - .0129; SOLID WASTE MANAGEMENT; have been adopted and read as follows:

.0124 STANDARDS

In determining the amount of the assessment, the Department or its delegates shall consider the following standards and shall cite those applicable:

(1) Nature of the violation and the degree and extent of the harm, including but not limited to the following:
  (a) for a violation of the Solid Waste Management Act, Article 13B of Chapter 130, and the rules promulgated thereunder:
    (i) type of violation
    (ii) type of waste involved
    (iii) duration
    (iv) cause (whether resulting from a negligent, reckless or intentional act or omission)
    (v) potential effect on public health and the environment
    (vi) effectiveness of responsive measures taken by the violator;
    (vii) damage to private property
  (b) for a violation of an order issued under the Solid Waste Management Act, Article 13B of Chapter 130.
    (i) subject matter of order
    (ii) duration
    (iii) cause (whether resulting from a negligent, reckless or intentional act or omission)
    (iv) type of violation, if any
    (v) potential effect on public health and the environment
    (vi) effectiveness of responsive measures taken by violator
  (c) for refusing to allow an authorized representative of the Commission for Health Services, any local board of health, or the Department of Human Resources a right of entry as provided for in G.S. 130-204.
    (i) type of other violation, if any
    (ii) duration of refusal
    (iii) potential effect on public health and the environment
    (iv) type of waste handled by violator at the solid waste management facility.
(2) Cost of rectifying any damage.

(3) The violator's previous record in complying or not complying with the Solid Waste Management Act and the regulations promulgated thereunder.

History Note: Statutory Authority G.S. 130-166.18; 130-166.21E; 130-205; Eff. April 15, 1979.

.0125 PROCEDURE FOR ASSESSMENT; REVOCATION OF PERMIT

(a) Depending on the violation involved, the Department or its delegates may issue a notice of penalty assessment immediately or grant the violator a period of time within which to cease the violation.

(b) For all violations for which a penalty is assessed a notice of such action shall be sent the respondent by registered or certified mail. The notice shall describe the nature of the violation with reasonable particularity, the amount of the penalty for each violation, that each day of a continuing violation constitutes a separate violation, advise that the penalty is now due or that it will become due at the end of a specified time, and advise the respondent of his rights of appeal as specified in 10 NCAC 1B .0200.

(c) If a permitted solid waste management facility is involved and a condition exists which is or may become injurious to the public health, the Department may revoke said permit. In addition to the information required to be included in subdivision (b), the notice of assessment shall state that there has been a tentative decision to revoke respondent's permit and that an administrative hearing will be held in accordance with rules contained in 10 NCAC 1B .0200 where respondent can challenge the penalty assessment and the permit revocation.

(d) If the violation of the Rules or law presents an imminent hazard to the public health or the environment as determined by the Secretary, the permit shall be revoked immediately. Notice of the revocation and the right to appeal shall be given forthwith to the operator.

(e) The Department or its delegates may modify a penalty upon finding that additional or different facts should have been considered in determining the amount of the assessment.

History Note: Statutory Authority G.S. 130-166.18; 130-166.21E; 130-205; Eff. April 15, 1979.

.0126 PAYMENT; HEARING; REMISSION/MITIGATION

(a) Within 30 days after receipt of notification of a penalty assessment, the respondent must tender payment, submit in writing a request for an administrative hearing specifying all the factual or legal issues in dispute, or submit in writing a request for an administrative hearing on remission or mitigation of the penalty stating the reasons why such request is justified. Where a hearing is requested, it shall be held in accordance with rules contained in 10 NCAC 1B .0200.

(b) Where a tentative decision has been made to revoke the permit of a solid waste management facility or where a permit has been revoked, the Department shall schedule a hearing to be held within 30 days after the respondent has received notification of the penalty assessment and the tentative decision to revoke his permit or the revocation of the permit. Such hearing is to be scheduled and conducted in accordance with rules contained in 10 NCAC 1B .0200. At this hearing, the respondent must present all challenges regarding the penalty assessment and permit revocation.

(c) Payment may be tendered in conjunction with a hearing request and in such case, the payment will be accepted as conditional upon final action.

(d) This rule shall not preclude informal conferences concerning the penalty assessed.

(e) Whenever an administrative hearing is scheduled, to avoid undue costs and delay the respondent will be required to state all the issues in dispute and the Department will be required to hold only one administrative hearing.

(f) The Department will acknowledge the receipt of all payments.

History Note: Statutory Authority G.S. 130-166.18;
130-166.21E;
Eff. April 15, 1979.

.0127 STAY OF PENALTY ASSESSMENT

When an administrative hearing is requested for a purpose other than remission or mitigation of the penalty assessed, the penalty will be stayed as of the date of said request until service of the final decision in accordance with Rule .0220, Subchapter 1B of this Title or other settlement of the matter.

History Note: Statutory Authority G.S. 130-166.18;
130-166.21E;
Eff. April 15, 1979.

.0128 CONTINUANCE; WAIVER OF ADMINISTRATIVE HEARING

(a) Notwithstanding Rule .0207, Subchapter 1B of this Title, the respondent may for good cause request a continuance of the hearing. Such request must be made in writing and received by the hearing office at least five (5) days before the scheduled hearing. The hearing office will determine if such a continuance should be granted or denied and shall so inform the respondent of its decision at least one (1) day prior to the scheduled hearing.

(b) A respondent waives his right to a hearing when he:

(1) submits a written waiver to the Department or its delegates of his right to an administrative hearing;

(2) fails to request a hearing within 30 days of receipt of notice of penalty assessment as provided for in Rule .0126 of this Subchapter; or

(3) fails to attend a scheduled administrative hearing.

History Note: Statutory Authority G.S. 130-166.18; 130-166.21E; Eff. April 15, 1979.

.0129 REFERRAL

If any administrative penalty as finally assessed is not paid within 60 days after receipt of notice of penalty assessment where no administrative hearing was requested or within 60 days after service of a written copy of the decision as provided for in G.S. 150A-36 where an administrative hearing was requested, the Secretary shall request the Attorney General to commence an action to recover the amount of the assessment.

History Note: Statutory Authority G.S. 130-166.18; 130-166.21E; Eff. April 15, 1979.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

P. O. Box 637, Franklin, N. C. 28734

David Simpson, Macon County Sanitarian
Macon County Health Department
Franklin, N. C. 28734

November 28, 1977

David,

On November 23, 1977, Jack King, Soil Scientist, investigated the site you are considering for expansion of the Macon County Landfill. This is the four-acre site adjacent to the south side of the landfill.

Soil limitations range from moderate to severe. Areas over 25 percent slope are severe. Other areas will be moderate to severe depending on the depth to hard rock.

Generally speaking, the soil on this tract consists of 2 to 3 feet of clay loam underlain by highly weathered gneiss rock which is fairly soft, but has many veins or ledges of moderately hard rock throughout. These ledges can be ripped with a dozer but do offer considerable resistance. Also it can be anticipated that the rock increases in hardness as the depth below 6 feet increases. Slopes over the area are in the range of 15 to 35 %. The soil is well drained.

"Danny" Callis

Fred D. Callis, Jr.
District Conservationist

Estimated Cost of Core Drilling

Travel 100
Engineering 125
Drilling 600 approx.
825

100 Travel
125 Engineering
5 Cost
600 Drilling
825

NORTH CAROLINA
MACON COUNTY

THIS AGREEMENT, Made and entered into this 10 day of May, 1973, by and between MACON COUNTY, a Body Politic and Political Subdivision of the State of North Carolina, party of the first part and the Town of Franklin a Municipal Corporation and Political Subdivision of the State of North Carolina, party of the second part.

WITNESSETH:

WHEREAS, party of the second part is the owner of a certain tract or parcel of land in Franklin Township, Macon County, North Carolina upon which has been operating a garbage dump; and

WHEREAS, party of the first part is desirous of using in connection with party of the second part said tract of land for the purpose of installing a sanitary land fill; and

WHEREAS, the health, safety and welfare of the citizens of both of the parties hereto requires that some central location be acquired and used for the purpose of disposing of refuse, garbage and junk within the respective corporate limits of said parties; and

WHEREAS, the public interest requires that such area be operated as a sanitary land fill; and

WHEREAS, party of the first part has on hand or is making arrangements to obtain certain equipment necessary for the operation of a sanitary land fill; and

WHEREAS, both parties feel it will be the best interest of their citizens that they oooperate in the furnishing and operation of a sanitary land fill.

NOW, THEREFORE, for and in consideration of the premises the parties hereto do hereby agree as follows:

1. Party of the first part will provide all equipment and man-power necessary to operate upon the lands of party of the second part a sanitary land fill.

NOW, THEREFORE, for and in consideration of the premises
aforesaid and the mutual benefits to be derived by the parties
hereto do hereby agree as follows:

1. Party of the first part will provide all equipment and
operation of a sanitary land fill.

WHEREAS, party of the first part may accept for disposal in the
sanitary land fill; and

WHEREAS, party of the first part has no land of its own suitable
for a sanitary land fill; and

WHEREAS, the public interest requires that such area be
developed and land within the respective corporate limits of
the parties hereto be reclaimed and used for the purpose of disposal of refuse;

WHEREAS, the health, safety and welfare of the citizens
of both of the parties hereto requires that some control location
in connection with party of the second part sold areas of land
for the purpose of disposal of refuse; and

WHEREAS, party of the first part is desirous of having
North Carolina above which has been described and desires party;
first or parcel of land in Franklin Township, Macon County,

WHEREAS, party of the second part is the owner of a certain

WITNESSETH:

of the second part;

and Political Subdivision of the State of North Carolina, party
of the first part and the Town of Franklin a Municipal corporation
Political Subdivision of the State of North Carolina, party
Now, 1971, by and between MACON COUNTY, a body Politic and

THIS AGREEMENT, Made and entered into this ____ day of

MACON COUNTY
NORTH CAROLINA

2. Party of the second part will provide the present property owned by it and now being used as a city garbage dump for the purpose of a sanitary land fill.

3. Party of the first part will at the earliest date possible commence operation of said sanitary land fill in accordance with the rules and regulations set therefor, by the North Carolina Department of Health.

4. Each of the parties hereto shall have the right to dispose of the garbage, refuse, trash and junk collected by their separate departments in said land fill area.

5. This agreement will exist and continue for so long as the tract of land hereinabove described shall be capable of being operated as a sanitary land fill area and until such time as the same shall have been filled.

IN WITNESS WHEREOF, the parties hereto do by authority of their respective governing boards duly and acting have caused these presence to be executed and their respective official seals affixed hereto.

MACON COUNTY

By: _____
Chairman, Board of County Commissioners
of Macon County, North Carolina

(CORPORATE SEAL)
Attest:

_____
Register of Deeds for Macon
County, and ex officio Clerk
of the Board of Commissioners of
Macon County, North Carolina.

TOWN OF FRANKLIN

By: _____
Mayor

(CORPORATE SEAL)

Attest:

_____
Clerk

NORTH CAROLINA, MACON COUNTY

The foregoing or annexed certificate(s) of _____ a N. P. of _____ County, State of _____; and _____ a N. P. of _____ County, State of _____; attested by _____ Seal(s) _____ certified to be correct. Presented for registration and recorded in this office in Book _____, Page _____, This _____ day of _____, 19 __ at _____ o'clock _____ M.

Lake V. Shope
Register of Deeds

_____
Register of Deeds Franklin, N. C.

AN ORDINANCE TO REGULATE THE USE OF MACON COUNTY SOLID WASTE COLLECTION FACILITIES

The County of Macon, State of North Carolina, through its Commissioners, duly assembled at its regular re-scheduled meeting, held on Monday, September 12, 1977, at the Board Meeting Room in the Macon County Courthouse in Franklin, North Carolina, upon motion duly made and unanimously passed, do hereby enact and ordain:

AN ORDINANCE TO REGULATE THE USE OF MACON COUNTY SOLID WASTE COLLECTION FACILITIES

SECTION ONE:

PURPOSE

The purpose of this ordinance is to protect and promote the health, safety and welfare of the citizens of Macon County by the regulation of the use of solid waste collection facilities in the County, including the "dumpsters" which are situated throughout the Coutny, by regulating the type of solid waste which can be deposited in and around such containers, and regulating the use of such containers with regard to cleanliness, safety and esthetics.

SECTION TWO:

AUTHORITY AND SCOPE

This ordinance is authorized under and by virtue of the general ordinance making power set forth in G.S. Sec. 130A-121, and the power to regulate solid waste as set forth in G.S. Sec. 153A-136.

SECTION THREE:

MATERIAL PERMISSABLE TO DEPOSIT IN SOLID WASTE COLLECTION CONTAINERS

From and after the passage of this ordinance it shall be unlawful for any person, firm or corporation to deposit in the county collection facilities, including the "dumpsters", the following articles:

(1) Bulk trash, tree limbs and tree trunks.

(2) Fluid,or material with a liquid consistency, not enclosed in leakproof containers.

(3) Scrap building material from construction, reconstruction, remodeling or repair of a building, walkway, driveway, sign and other structure, including, but not limited to, excavated earth, rocks, gravel, brick, plastic, concrete, lumber or any other similar building materials used in construction or the containers or wrappings therefor.

(4) Large manmade articles such as car parts, home appliances and furnishings or other business or farm machinery or equipment.

(5) All putrescible wastes not placed in a plastic bag, or some other suitable enclosed disposal container, animal and vegetable matter, animal offal and carcasses, and recognizable industrial by-products.

(6) All sewage and human waste.

SECTION FOUR:

MAINTENANCE AND USE OF CONTAINERS AND GROUNDS UPON WHICH THEY ARE LOCATED

No garbage, refuse, solid waste or any other permissable or non-permissable matter shall be placed outside the authorized county garbage and refuse collection containers. All garbage and refuse which is dropped prior or after depositing in a container, or which falls out of a container due to same being full, shall be cleaned up from the premises and removed by any person using same.

SECTION FIVE:

VIOLATION

The violation of any section of the article shall be punishable by fine up to $50.00, plus court costs.

SECTION SIX:

EFFECTIVE DATE

This Ordinance shall be effective immediately upon passage.

The undersigned, Clerk of the Macon County Board of Commissioners, do hereby certify that the foregoing Ordinance was duly adopted at the regular re-scheduled meeting of the Macon County Board of Commissioners held on the 12th day of September, 1977, and has been placed in the Book of Ordinances for Macon County, in the office of the Register of Deeds.

This the 12th day of September, 1977

Joel R. Mashburn
County Manager and Ex-Officio Clerk
to the Board

Filed for registration on the 15 day of Sept., 1977, at 3:10 o'clock P. M., and registered and verified in the office of the Register of Deeds for Macon County in Book No. 1 Page 7 This 15 day of Sept., 1977.

Milton Trotter (jlp)
Register of Deeds for Macon County

At a regular meeting of the Board of Commissioners of Macon County, North Carolina, held at the Board room in the County Courthouse in Franklin, North Carolina, on the 6th day of February, 1978, the following resolution was introduced by Commissioner Penland.

WHEREAS, the Board of Commissioners of Macon County is empowered to regulate the collection and disposal of solid waste by private persons, firms or corporations, outside of the incorporated cities and towns within Macon County, under the provisions of Chapter 153A, Article 6 of the General Statutes of North Carolina, and particularly Section 136 thereof; and

WHEREAS, under the provision of Chapter 153A, Article 6 and of the General Statutes of North Carolina and particularly Section 132.1 thereof, the Board of County Commissioners is authorized to enact ordinances governing the removal, method or manner of disposal, depositing or dumping of any trash, debris, garbage, litter, discarded cans or receptacle or any waste matter whatsoever within the rural areas of the County, and outside and beyond the corporate limits of any municipality of the County; and

WHEREAS, it is deemed advisable to issue license and grant exclusive right to collect and dispose of garbage for compensation within specified areas to certain individuals for the purpose of encouraging and insuring an adequate and continuing service of garbage and solid waste collection and disposal;

THEREFORE, BE IT RESOLVED:

That Don Ledford be, and he is hereby granted, the license and exclusive right to collect and/or dispose of garbage for compensation within the following areas:

(a) Starting at city limits on Bryson City Road, serving Riverbend Road, Burningtown Road, Iotla Community to Cowee School, Sanderstown Road to Sylva Road, Waysider Antique Shop on Cowee

Mountain, Rabbit Creek, Cat Creek, and homes outside of city in Van Raalte Community, Highway 28 and side roads to Cowee School, Sanderstown Road to Highway 23 North, Highway 23-441 North and side roads to Waysider Antiques on Cowee Mountain.

(b) Starting at city limits on Highlands Road and serving Pine Hill Trailer Park Road to Cat Creek Road, Palmer Road to Mr. O'Neil, Bethel Church Road to Mr. Whitaker, Bethel Community, Cullasaja Community, Ellijay Road, Nickajack Road, U. S. Highway 64 East to Buck Creek at foot of Highlands Mountain and back side of river to Cullasaja Assembly of God Church, Belle View Community, Dowdle Mountain, Clark's Chapel, Prentiss, Highway 64 East and side roads to foot of mountain, from Highway 64 West to Highway 23-441 South through Belle View, Dowdle Mountain, Clark's Chapel and Prentiss.

(c) Beginning at city limits on Murphy Road, serving Baird Cove, Palmer Drive, Roller Mill Road, area to right and left of Setser's Store, Louisa Chapel Road, Crawford Road, Patton Community Road to Highway 23 South, Highway 64 West and side roads to Richard Slagle, Wayah Bald Road to foot of mountain, Patton Road from Highway 64 to Highway 23.

(d) Beginning at city limits on the Georgia Road and running with U. S. Highway 23-441 South and side roads through Mulberry Community, serving Golf Course Community, Theo Siler Road, area behind Blue Bell, road by Roy Fouts, Wide Horizon Drive, Longview Community, John Teague Road, Setser Branch Road, North Skeenah, Riverside, Otto, Tessenta, Norton Straight to Mulberry, Coweeta and Bates Branch.

(e) All of the area of Highlands Township, excluding the areas inside the limits of the Town of Highlands.

BE IT FURTHER RESOLVED:

That Don Ledford shall charge as fees for the collection and disposal of garbage and solid waste, the sum of $1.00 per week for services rendered to private homes and $5.00 per week

for services rendered to business establishments. The aforementioned rate applies only to ordinary garbage and solid waste disposal services and contemplates the use of practical garbage containers such as regular garbage cans. Charges for unusual services are not to be regulated by this Resolution and are left to negotiation between the parties involved, subject, however, to approval by the Board of Commissioners of Macon County. The rates for collection and disposal services herein set may be adjusted only with the consent and approval of the Macon County Board of Commissioners.

BE IT FURTHER RESOLVED:

That the license and exclusive right conferred hereby shall be for a period of seven years, provided, however, that the licensee must at all times operate his garbage and solid waste collection and disposal business according to the specifications set forth by the Board of County Commissioners, a copy of which is attached hereto, and in accordance with the regulations for collection and disposal of garbage and solid waste as shall from time to time be adopted by the North Carolina State Board of Health. Should the licensee at any time fail to comply with the specifications hereinabove referenced, and/or the regulations adopted from time to time by the North Carolina State Board of Health, then and in that event, upon the failure of the licensee to cure any such defect or default within thirty (30) days after written notice of the existence of the same shall have been given to licensee, the Macon County Board of Commissioners may withdraw this license and exlusive right without further notice.

Upon Motion of Commissioner Perkins, and seconded by Commissioner Burrell, the foregoing Resolution was adopted by the unanimous vote of the Macon County Board of Commissioners.

This the 6th day of February, 1978.

Chairman, Macon County Board of Commissioners

Attest:

County Manager, Ex-Officio Clerk of the Board

SPECIFICATIONS FOR GARBAGE COLLECTION AND DISPOSAL

WHEREAS, the Board of County Commissioners of Macon County is empowered by Chapter 153, Article 6 of the General Statutes of the State of North Carolina to regulate the methods of collecting and disposing of garbage and solid waste within the County and outside the boundaries of incorporated cities and towns, the following specifications are hereby set forth:

1. Disposal areas must be inspected and approved by the Board of Commissioners.

2. Method of disposal must be approved by the Board of County Commissioners.

3. There must be a regular schedule for collection of garbage and solid waste.

4. Collection must be made in a manner and with proper equipment so that garbage and solid waste is not strewn on public roads and highways.

MINUTES OF THE REGULAR MEETING OF
THE BOARD OF COMMISSIONERS OF MACON COUNTY, NORTH CAROLINA HELD ON THE 5th DAY OF March, 1979

At a regular meeting of the Board of Commissioners of Macon County, North Carolina, held at the Board Room at the County Courthouse in Franklin, North Carolina, on the 5th day of March, 1979, the following resolution was introduced by Commissioner Mason. Seconded by Commissioner Carpenter, and unanimously approved.

WHEREAS, the Board of Commissioners of Macon County is empowered to regulate the collection and disposal of solid waste by private persons, firms or corporations, outside of the incorporated cities and towns within Macon County, under the provisions of Chapter 153A, Article 6 of the General Statutes of North Carolina, and particularly Section 136 thereof; and

WHEREAS, under the provision of Chapter 153A, Article 6 of the General Statutues of North Carolina, and particularly Section 132.1 thereof, the Board of County Commissioners of Macon County is authorized to enact ordinances governing the removal, method or manner of disposal, depositing or dumping or any trash, debris, garbage, litter, discarded cans, or receptacles, or any waste matter whatsoever within the rural areas of the County, and outside and beyond the corporate limits of any municipality of the County; and

WHEREAS, by Resolution enacted at the regular meeting of the Macon County Board of Commissioners on the 6th day of

February, 1978, Don Ledford was granted the license and exclusive right to collect and/or dispose of garbage for compensation within the areas of Macon County described therein; and

WHEREAS, said Resolution of February 6, 1978, provided the fees which could be charged by Don Ledford for the services therein regulated and licensed, and further provided that such fees and rates for collection and disposal services could be adjusted only with the consent and approval of the Macon County Board of Commissioners; and

WHEREAS, the said Don Ledford has personally appeared before this Board, and has shown good cause why the rates should be increased, and particularly the increased cost of the services rendered, and inflationary condition of the general economy;

THEREFORE, BE IT RESOLVED: That the Resolution enacted by the Board of Commissioners at its regular meeting on the 6th day of February, 1978, be and the same is hereby amended, by deleting in full the paragraph thereof relative to the rates or fees charged, and by inserting in place and instead thereof the following:

> That Don Ledford may charge as fees for the collection and disposal of garbage and solid waste, the sum of $60.00 per year for services rendered to private homes, and the sum of $1.50 per cubic yard of garbage and solid waste disposed of for business establishments. The aforementioned rates apply only to ordinary garbage and solid waste disposal services and contemplates the use of practical garbage containers such as regular garbage cans. Charges for unusual services are not to be regulated by this Resolution and are left to negotiation between the parties involved, subject, however, to the approval thereof by the Board of Commissioners of Macon County. The rates for collection and disposal services herein set may be adjusted only with the consent and approval of the Macon County Board of Commissioners.
>
> Upon Motion of Commissioner Mason, seconded by Commissioner

Carpenter, the foregoing Resolution was adopted by the unanimous vote of the Macon County Board of Commissioners.

This the 5th day of March, 1979.

Chairman, Macon County Board of Commissioners

Attest:

County Manager
Ex Officio Clerk to the Board

GUIDELINES
FOR PLACEMENT OF
GARBAGE COLLECTION CONTAINERS
ON STATE HIGHWAY SYSTEM
RIGHTS-OF-WAY

N. C. Department of Transportation
Division of Highways
May, 1974

TABLE OF CONTENTS

INTRODUCTION

The North Carolina State Board of Health was authorized by the 1969 General Assembly to establish a Statewide solid waste disposal system. The containerized system has provided disposal facilities within a reasonable distance of the rural resident and has reduced roadside dumping and littering.

To further improve the flexibility of the solid waste disposal program, the 1973 Session (2nd Session 1974) of the General Assembly authorized the Board of Transportation to issue permits to counties and municipalities for the location of container sites on rights-of-way of certain State-maintained roads. The location of container sites on fully controlled access highways is prohibited. The Statute is codified as General Statute 136-18.3. A copy of this Statute is included on pages 2 and 3.

At its meeting on May 9, 1974, the Board of Transportation adopted a General Ordinance setting forth rules and regulations covering the location of garbage collection containers on highway rights-of-way. A copy of the General Ordinance is included on pages 4 and 5.

These guidelines set forth the rules and regulations to be administered by the Department of Transportation regulating the location of garbage collection container sites within the rights-of-way of State-maintained roads.

The objectives of the regulations and guidelines contained herein are:

1. To provide maximum protection and safety to the public through the orderly control of traffic entering and leaving the roadway at garbage collection container sites.

2. To provide a uniform policy throughout the State in the design and construction of sites.

3. To develop a comprehensive program for improving garbage disposal methods throughout the State.

Please use the sketches and details contained in this pamphlet as a guide realizing that every condition has not been covered. When conditions exist that require deviation, every effort should be made to properly place the containers in locations that will not detract from or introduce hazardous conditions to our roadways.

With the cooperation of the counties, municipalities, and citizens of North Carolina, the success of this program should continue to benefit the State.

GENERAL ASSEMBLY OF NORTH CAROLINA

1973 SESSION (2nd SESSION, 1974)

RATIFIED BILL

CHAPTER 1381

SENATE BILL 1064

AN ACT TO AUTHORIZE THE LOCATION OF GARBAGE COLLECTION CONTAINERS BY MUNICIPALITIES AND COUNTIES ON THE STATE HIGHWAY SYSTEM RIGHTS-OF-WAY.

The General Assembly of North Carolina enacts:

Section 1. Chapter 136 of the General Statutes is hereby amended by adding a new section to read as follows:

" 136-18.3. Location of garbage collection containers by counties and municipalities.--(a) The Board of Transportation is authorized to issue permits to counties and municipalities for the location of containers on rights-of-way of State-maintained highways for the collection of garbage. Such containers may be located on highway rights-of-way only when authorized in writing by the State Highway Administrator in accordance with rules and regulations promulgated by the Board of Transportation. Such rules and regulations shall take into consideration the safety of travelers on the highway and the elimination of unsightly conditions and health hazards. Such containers shall not be located on fully controlled access highways.

(b) The provisions of G. S. 14-399, which make it a misdemeanor to place garbage on highway rights-of-way, shall not apply to persons placing garbage in containers in accordance with rules and regulations promulgated by the Board of Transportation.

(c) The written authority granted by the Board of Transportation shall be no guarantee that the State system highway rights-of-way on which the containers are authorized to be located is owned by the Board of Transportation, and the issuance of such written authority shall be granted only when the county or municipality certifies that written permission to locate the refuse container has been obtained from the owner of the underlying fee if the owner can be determined and located.

(d) Whenever any municipality or county fails to comply with the rules and regulations promulgated by the Board of Transportation or whenever they fail or refuse to comply with any order of the Board of Transportation for the removal or change in the location of a container, then the permit of such county or municipality shall be revoked. The location of such garbage containers on highway rights-of-way after such order for removal or change is unauthorized and illegal. The Board of Transportation shall have the authority to remove such unauthorized or illegal containers and charge the expense of such removal to the county or municipality failing to comply with the order of the Board of Transportation."

Section 2. This act shall become effective upon ratification.

In the General Assembly read three times and ratified, this the 12th day of April, 1974.

JAMES B. HUNT, JR.

James B. Hunt, Jr.
President of the Senate

JAMES E. RAMSEY

James E. Ramsey
Speaker of the House of Representatives

GENERAL ORDINANCE

The following ordinance was adopted by the Board of Transportation on May 9, 1974.

Under and by virtue of authority conferred upon it by Chapter 1381 of the 1973 Session of the General Assembly (G.S. 136-18.3), the Board of Transportation does hereby ordain, establish and promulgate the following General Ordinance to be effective upon adoption and to be codified as Section 12.2:

Sec. 12.2 (1) No garbage collection container site shall be located on any State highway rights-of-way except by written authorization of the Board of Transportation signed by the State Highway Administrator.

(2) No containers shall be placed on the rights-of-way of fully controlled access highways.

(3) Applicant shall obtain written permission from the underlying fee owner of the site if the owner can be determined or located after a diligent search.

(4) No garbage collection container shall be located within 500 feet of an occupied dwelling unless the applicant obtains written permission from the owner of the dwelling.

(5) An application for a site permit may be obtained from and shall be submitted to the District Engineer for the county in which the garbage container is proposed to be located.

(6) a. The county or municipality requesting the permit shall be responsible for any work to be performed in preparation of the site. Any work performed on the site by the Department of Transportation will be on a reimbursable basis in accordance with the Board of Transportations's policy adopted May 2, 1973.

b. Container sites adjacent to paved roadways shall be constructed to standards as required by the District Engineer.

c. Container sites adjacent to unpaved roads shall be prepared with similar materials as exist on the traveled portion of the roadway.

(7) When container sites are located in areas requiring drainage, proper drainage shall be provided as directed by the District Engineer or his representative.

(8) Whenever container sites are located adjacent to the roadway, minimum adequate sight distances shall be provided for the vehicle entering the road from the container site.

(9) Container sites shall be permitted adjacent to roadways only when safe lateral clearances can be provided from the edge of pavement to the container. The District Engineer shall determine the safe lateral clearances to be provided at each site.

(10) The county or municipality shall maintain an adequate collection schedule to insure that there will be no spillage or overflow from the containers.

(11) Whenever any municipality or county fails to comply with the rules and regulations contained herein or whenever they fail or refuse to comply with any order of the Board of Transportation for the removal or change in the location of a container, the permit of such county or municipality shall be revoked by the Board of Transportation. The Board of Transportation shall remove the unauthorized or illegal containers and charge the expense of such removal to the county or municipality failing to comply with the order of the Board of Transportation.

GUIDELINES

The following guidelines have been developed for the District Engineer's use in assuring compliance with General Statute 136-18.3 and the General Ordinance adopted by the Board of Transportation.

A. Site Permit Requirements

1. The county or municipality desiring to locate garbage collection containers on State highway system right-of-way shall obtain a site permit from the District Engineer having jurisdiction in the area. The appropriate District Engineer's office can be determined from the listing shown on pages 8-10.

2. The permit shall be properly and clearly completed in duplicate. In processing the permit, the District Engineer will keep one copy and return the other to the applicant. The location of the property must be identified clearly enough for the proposed site to be located in the field.

3. Failure to secure a permit prior to locating a container on State rights-of-way may result in the removal of such at the expense of the county or municipality.

4. The District Engineer will process the permit and advise the applicant of approval or disapproval within 30 days after submission. Upon approval of the permit by the District Engineer, the site development shall be completed as expeditiously as possible.

B. Site Preparation

1. If the site is prepared by the District Engineer, it will be done only pursuant to a written agreement and any costs incurred by the Division of Highways will be reimbursed by the county or municipality. An agreement for reimbursable work will be required to outline the responsibilities and duties of each party. (See page 17). The District Engineer will furnish the necessary information. The agreement is subject to execution by the Administrator.

2. It will be the duty of the District Engineer or his representative to inspect the site preparation work during construction.

3. Container sites adjacent to paved roadways should consist of a minimum 6" compacted base placed on a firm subgrade. A 4' paved shoulder should be constructed adjacent to the container site.

C. Site Location Requirements

1. Each proposed site shall be inspected by representatives from the District Office and the applicant.

2. No more than four containers should be placed at any one site.

3. Whenever container sites are located adjacent to the roadway, the following sight distances shall be provided for the vehicle entering the road from the container site:

Posted Highway Speed (MPH)	30	35	40	45	50	55	60
Sight Distance (Feet)	420	490	560	630	700	770	840

See page 16 for Sight Distance Layout.

4. Container sites may be located adjacent to roadways where the following minimum offsets from the edge of pavement to the container can be provided.

UNPAVED ROADS

Minimum distance of 24' from the center line of the roadway.

PAVED ROADS

Posted Highway Speed (MPH)	Existing Traffic Volume (ADT)	Distance from Edge of Pavement (Feet)
All Speeds	Under 800	12 Minimum 18 Desirable
Less than 50	800 to 2,000	12 Minimum 18 Desirable
50 and greater	800 to 2,000	18 Minimum 30 Desirable
Less than 50	Over 2,000	12 Minimum 22 Desirable
50 and greater	Over 2,000	22 Minimum 30 Desirable

NOTE:

The offset distances shown above and on the location sketches are minimums. In curb and gutter sections, the offset may be reduced to a minimum 8' from the face of curb. Curb cuts should be designed as directed by the District Engineer. Where existing right-of-way is available and topography permits, the containers should be placed as far from the edge of pavement as possible.

5. When garbage container sites are to be constructed outside of the existing rights-of-way, an application for a special commercial permit may be obtained from and shall be submitted to the District Engineer for approval.

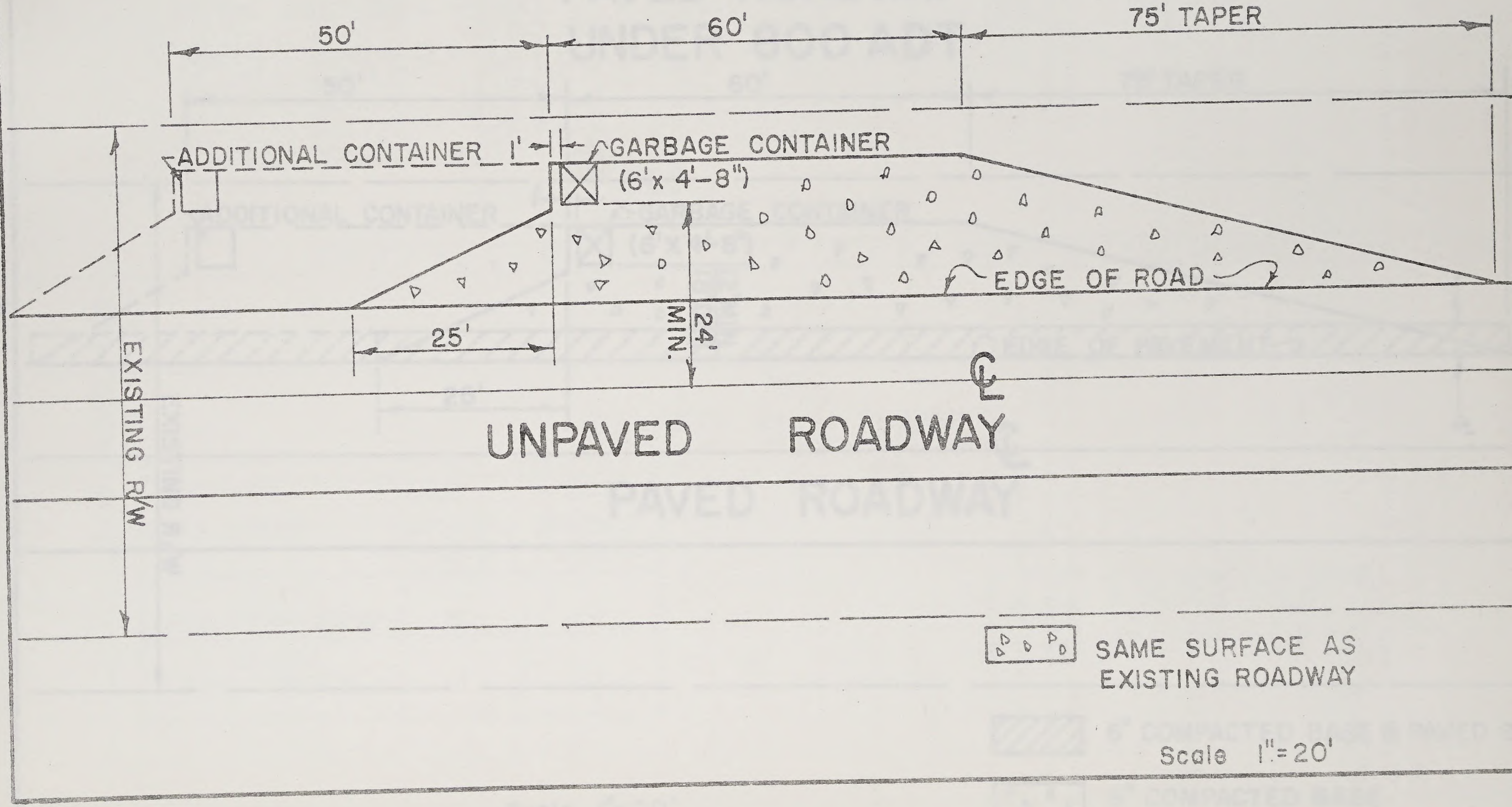
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
DISTRICT OFFICES

COUNTY	OFFICE LOCATION	TELEPHONE
Alamance	Graham, North Carolina 27253	919-226-7017
Alexander	Statesville, North Carolina 28677	704-872-7696
Alleghany	Elkin, North Carolina 28621	919-835-4241
Anson	Albemarle, North Carolina 28001	704-982-0101
Ashe	North Wilkesboro, North Carolina 28659	919-667-6301
Avery	Boone, North Carolina 28607	704-264-3676
Beaufort	Washington, North Carolina 27889	919-946-3689
Bertie	Ahoskie, North Carolina 27910	919-332-4192
Bladen	Whiteville, North Carolina 28472	919-642-3760
Brunswick	Burgaw, North Carolina 28425	919-259-2119
Buncombe	Asheville, North Carolina 28802	704-252-3851
Burke	Marion, North Carolina 28752	704-652-3344
Cabarrus	Albemarle, North Carolina 28001	704-982-0101
Caldwell	Boone, North Carolina 28607	704-264-3676
Camden	Elizabeth City, North Carolina 27909	919-335-5587
Carteret	New Bern, North Carolina 28560	919-637-3411
Caswell	Graham, North Carolina 27253	919-226-7017
Catawba	Statesville, North Carolina 28677	704-872-7696
Chatham	Asheboro, North Carolina 27203	919-629-1423
Cherokee	Bryson City, North Carolina 28713	704-488-2131
Chowan	Plymouth, North Carolina 27962	919-793-4568
Clay	Bryson City, North Carolina 28713	704-488-2131
Cleveland	Shelby, North Carolina 28150	704-482-3874
Columbus	Whiteville, North Carolina 28472	919-642-3760
Craven	New Bern, North Carolina 28560	919-637-3411
Cumberland	Fayetteville, North Carolina 28302	919-483-1344
Currituck	Elizabeth City, North Carolina 27909	919-335-5587
Dare	Elizabeth City, North Carolina 27909	919-335-5587
Davidson	Salisbury, North Carolina 28144	704-633-0526
Davie	Winston-Salem, North Carolina 27102	919-722-9823
Duplin	Clinton, North Carolina 28328	919-592-2034
Durham	Durham, North Carolina 27702	919-477-7183
Edgecombe	Halifax, North Carolina 27890	919-583-5861
Forsyth	Winston-Salem, North Carolina 27102	919-722-9823
Franklin	Henderson, North Carolina 27536	919-492-0111
Gaston	Shelby, North Carolina 28150	704-482-3874
Gates	Elizabeth City, North Carolina 27909	919-335-5587
Graham	Bryson City, North Carolina 28713	704-488-2131
Granville	Durham, North Carolina 27702	919-477-7183
Greene	Kinston, North Carolina 28501	919-527-0053
Guilford	Greensboro, North Carolina 27408	919-275-4544

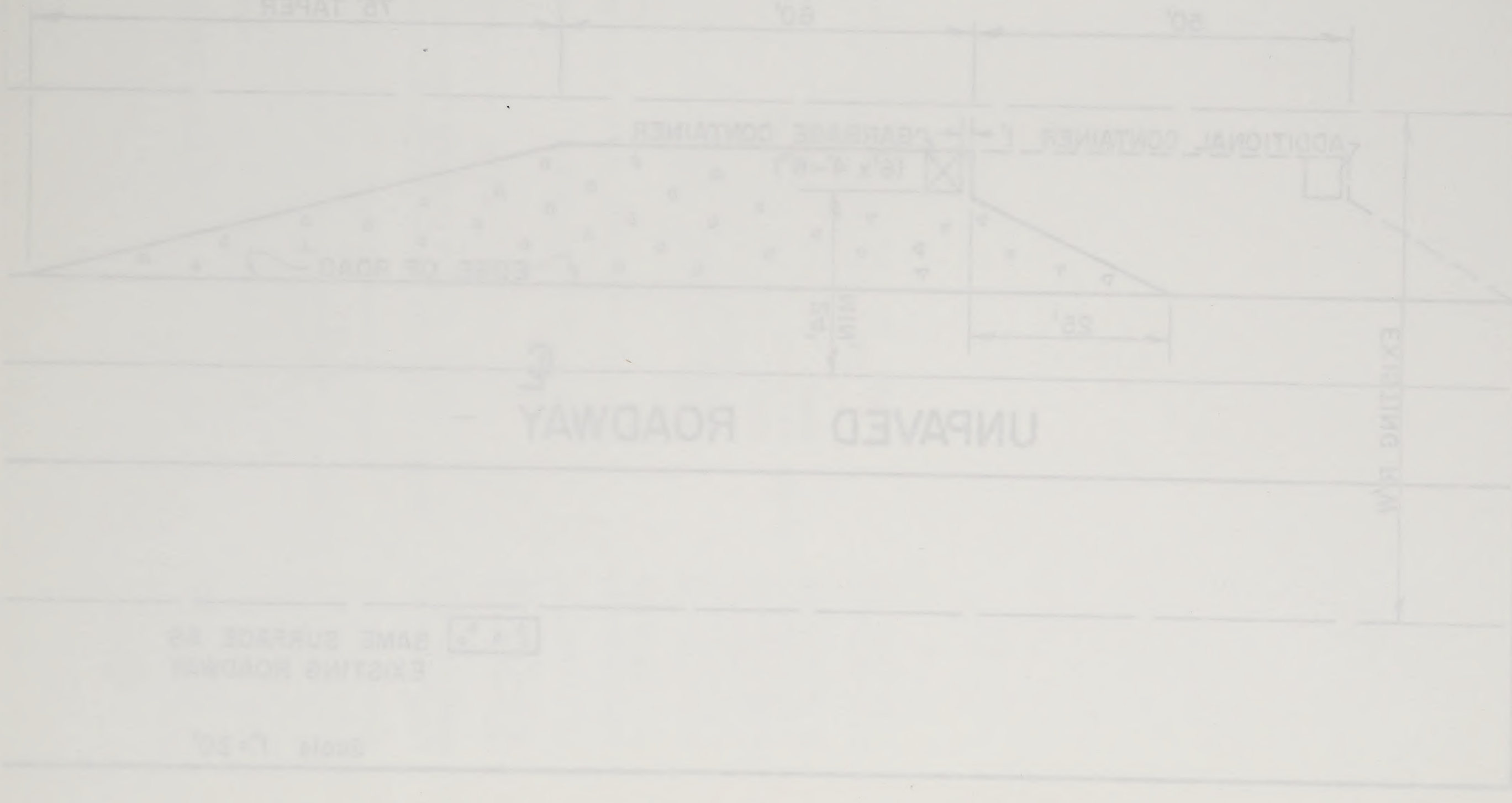
COUNTY	OFFICE LOCATION	TELEPHONE
Halifax	Halifax, North Carolina 27890	919-583-5861
Harnett	Fayetteville, North Carolina 28302	919-483-1344
Haywood	Hendersonville, North Carolina 28739	704-891-7911
Henderson	Hendersonville, North Carolina 28739	704-891-7911
Hertford	Ahoskie, North Carolina 27910	919-332-4192
Hoke	Aberdeen, North Carolina 28315	919-944-7621
Hyde	Plymouth, North Carolina 27962	919-793-4568
Iredell	Statesville, North Carolina 28677	704-872-7696
Jackson	Bryson City, North Carolina 28713	704-488-2131
Johnston	Goldsboro, North Carolina 27530	919-778-3435
Jones	Kinston, North Carolina 28501	919-527-0053
Lee	Aberdeen, North Carolina 28315	919-944-7621
Lenoir	Kinston, North Carolina 28501	919-527-0053
Lincoln	Shelby, North Carolina 28150	704-482-3874
McDowell	Marion, North Carolina 28752	704-652-3344
Macon	Bryson City, North Carolina 28713	704-488-2131
Madison	Asheville, North Carolina 28802	704-252-3851
Martin	Plymouth, North Carolina 27962	919-793-4568
Mecklenburg	Charlotte, North Carolina 28201	704-332-8020 704-375-8363
Mitchell	Marion, North Carolina 28752	704-652-3344
Montgomery	Rockingham, North Carolina 28379	919-895-6358
Moore	Aberdeen, North Carolina 28315	919-944-7621
Nash	Nashville, North Carolina 27856	919-459-2128
New Hanover	Burgaw, North Carolina 28425	919-259-2119
Northampton	Ahoskie, North Carolina 27910	919-332-4192
Onslow	Burgaw, North Carolina 28425	919-259-2119
Orange	Graham, North Carolina 27253	919-226-7017
Pamlico	New Bern, North Carolina 28560	919-637-3411
Pasquotank	Elizabeth City, North Carolina 27909	919-335-5587
Pender	Burgaw, North Carolina 28425	919-259-2119
Perquimans	Elizabeth City, North Carolina 27909	919-335-5587
Person	Durham, North Carolina 27702	919-477-7183
Pitt	Washington, North Carolina 27889	919-946-3689
Polk	Hendersonville, North Carolina 28739	704-891-7911
Randolph	Asheboro, North Carolina 27203	919-629-1423
Richmond	Rockingham, North Carolina 28379	919-895-6358
Robeson	Lumberton, North Carolina 28358	919-739-5265
Rockingham	Greensboro, North Carolina 27408	919-275-4544
Rowan	Salisbury, North Carolina 28144	704-633-0526
Rutherford	Marion, North Carolina 28752	704-652-3344

COUNTY	OFFICE LOCATION	TELEPHONE
Sampson	Clinton, North Carolina 28328	919-592-2034
Scotland	Rockingham, North Carolina 28379	919-895-6358
Stanly	Albemarle, North Carolina 28001	704-982-0101
Stokes	Winston-Salem, North Carolina 27102	919-722-9823
Surry	Elkin, North Carolina 28621	919-835-4241
Swain	Bryson City, North Carolina 28713	704-488-2131
Transylvania	Hendersonville, North Carolina 28739	704-891-7911
Tyrrell	Plymouth, North Carolina 27962	919-793-4568
Union	Charlotte, North Carolina 28201	704-332-8020 704-375-8363
Vance	Henderson, North Carolina 27536	919-492-0111
Wake	Raleigh, North Carolina 27554	919-829-3213 919-829-7759
Warren	Henderson, North Carolina 27536	919-492-0111
Washington	Plymouth, North Carolina 27962	919-793-4568
Watauga	Boone, North Carolina 28607	704-264-3676
Wayne	Goldsboro, North Carolina 27530	919-778-3435
Wilkes	North Wilkesboro, North Carolina 28659	919-667-6301
Wilson	Nashville, North Carolina 27856	919-459-2128
Yadkin	Elkin, North Carolina 28621	919-835-4241
Yancey	Asheville, North Carolina 28802	704-252-3851

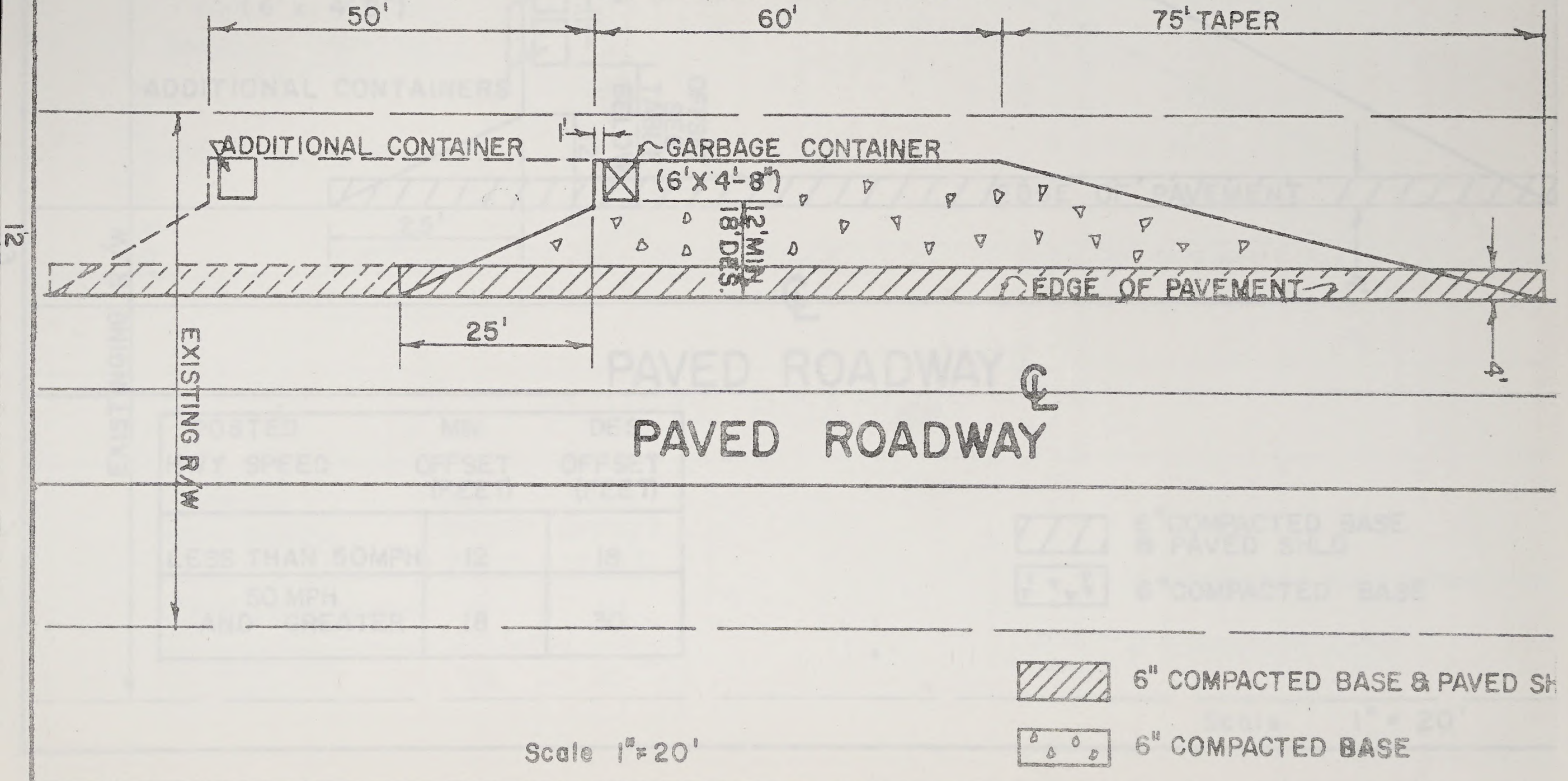
SUGGESTED SITE PLAN
FOR
UNPAVED ROADWAY



SUGGESTED SITE PLAN
FOR
UNPAVED ROADWAY



SUGGESTED SITE PLAN
FOR
PAVED ROADWAY
UNDER 800 ADT



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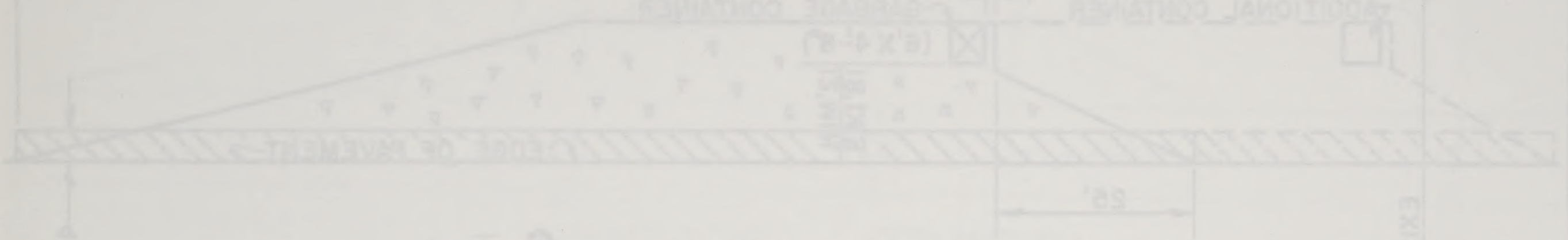
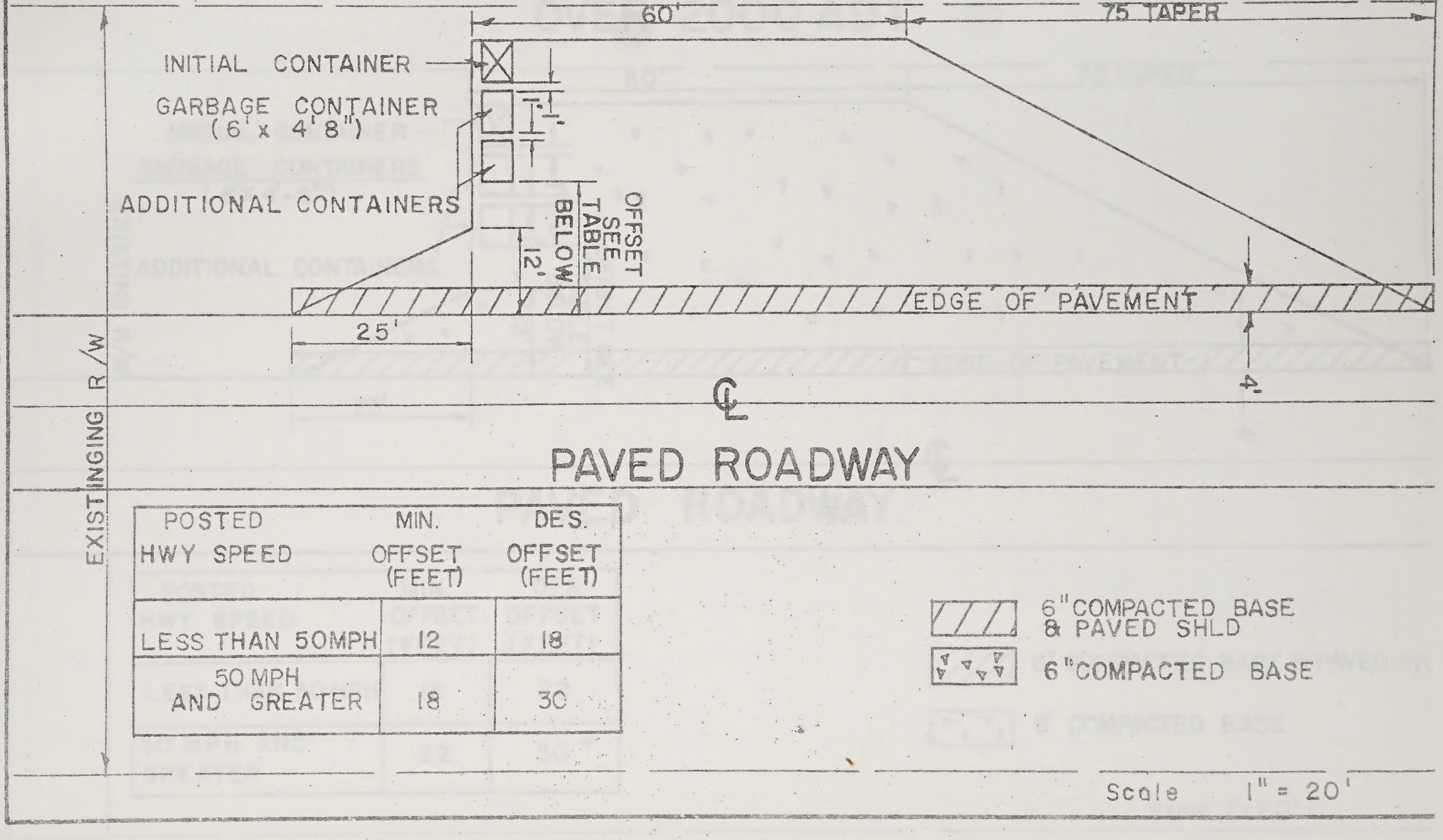


SUGGESTED SITE PLAN
FOR
PAVED ROADWAY
800 TO 2,000 ADT



POSTED HWY SPEED	MIN. OFFSET (FEET)	DES. OFFSET (FEET)
LESS THAN 50MPH	12	18
50 MPH AND GREATER	18	30

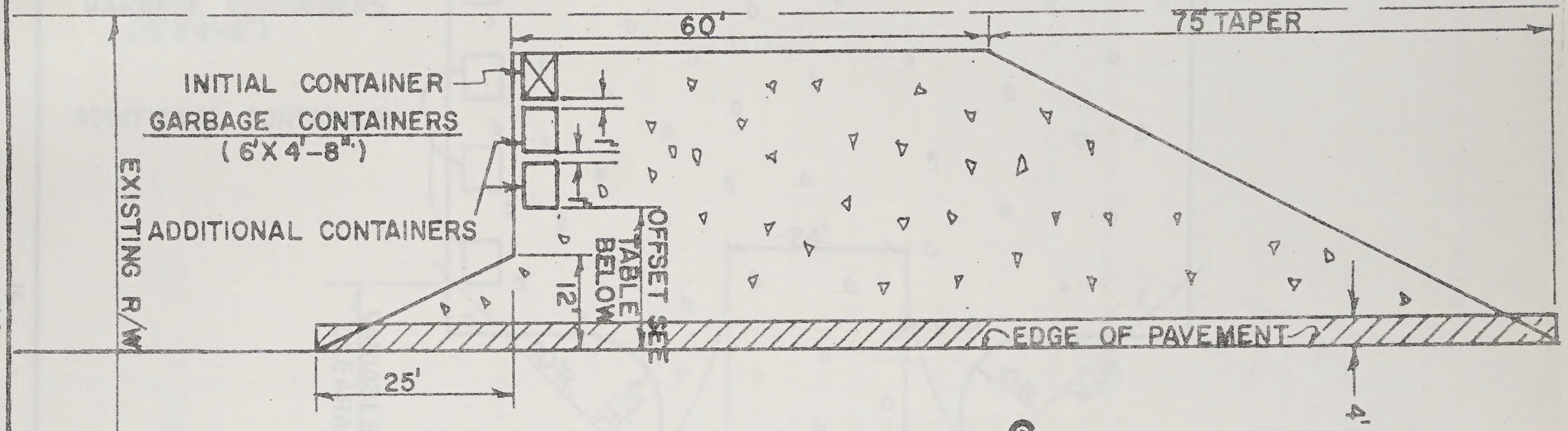
6" COMPACTED BASE & PAVED SHLD

6" COMPACTED BASE

Scale 1" = 20'

HWY SPEED	MIN. OFFSET (FEET)	DES. OFFSET (FEET)
LESS THAN 50MPH	12	18
50 MPH AND GREATER	18	30

SUGGESTED SITE PLAN
FOR
PAVED ROADWAY
OVER 2000 ADT



PAVED ROADWAY

POSTED HWY SPEED	MIN. OFFSET (FEET)	DES. OFFSET (FEET)
LESS THAN 50 MPH	12	22
50 MPH AND GREATER	22	30 *

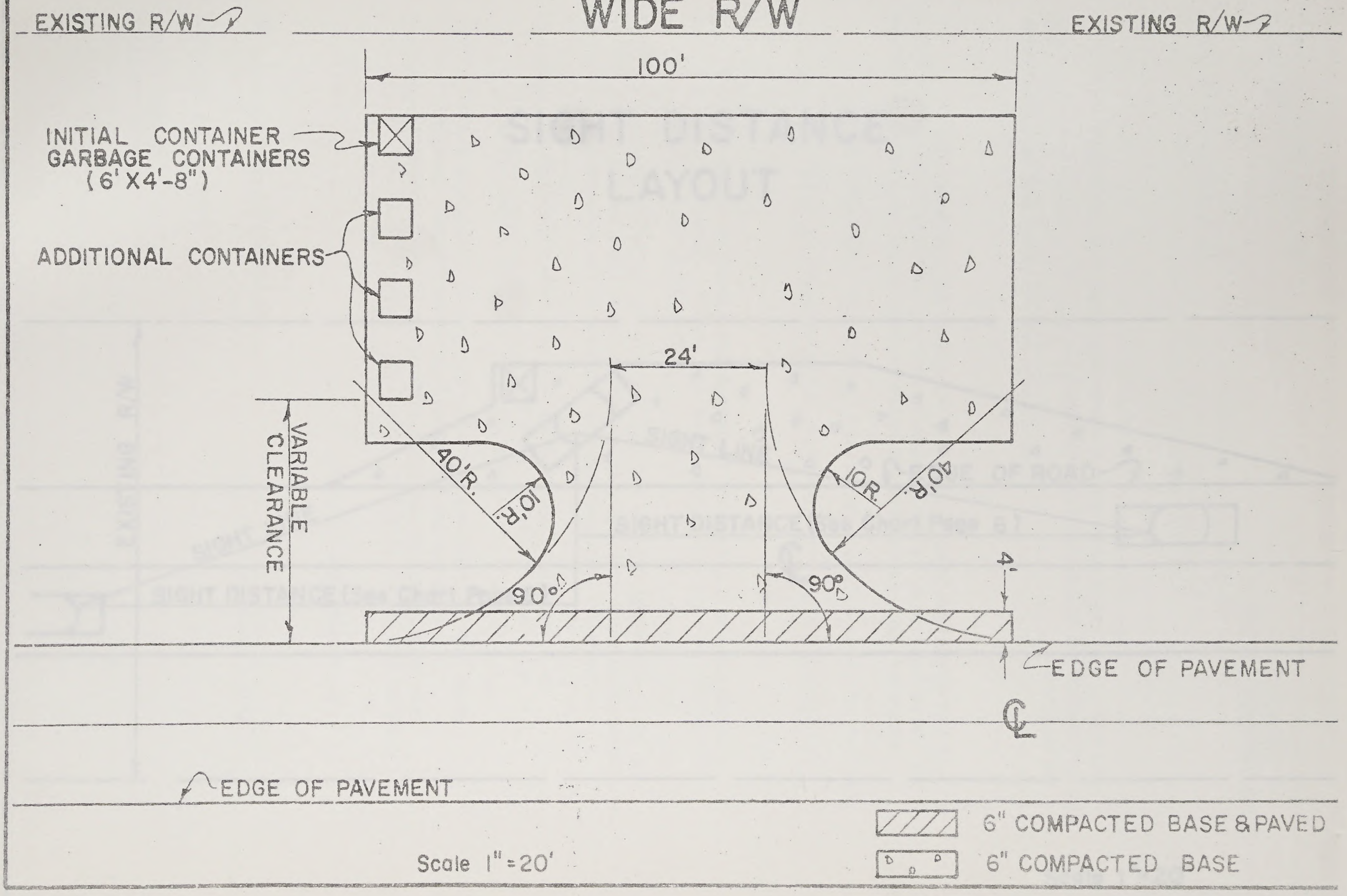
6" COMPACTED BASE & PAVED SH.

6" COMPACTED BASE

Scale 1"=20'

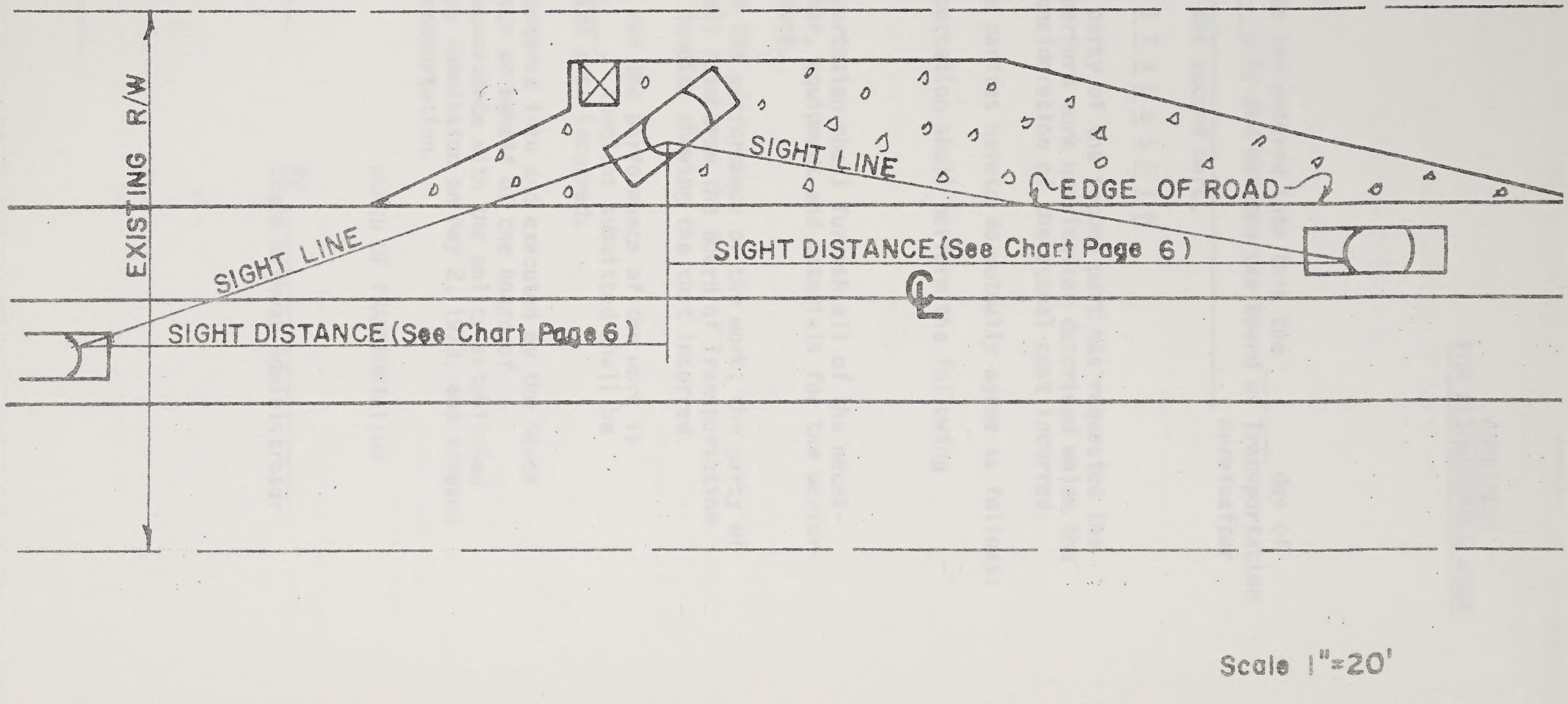

EXISTING
25'

SUGGESTED SITE PLAN FOR WIDE R/W




100'
24'
90°
90°
30°
30°
INITIAL CONTAINER
GARBAGE CONTAINERS
(6' X4'-6")
ADDITIONAL CONTAINERS
TOWARD STREET

SIGHT DISTANCE
LAYOUT



Scale 1"=20'

SIGHT DISTANCE
LAYOUT

STATE OF NORTH CAROLINA
COUNTY OF

AGREEMENT
FOR REIMBURSABLE WORK

BOARD OF TRANSPORTATION
and

THIS AGREEMENT made and entered into this the _____ day of _____, 19 ____, by and between the Board of Transportation and _____ hereinafter referred to as the party of the second part;

W I T N E S S E T H

THAT WHEREAS, the party of the second part has requested the Board of Transportation to perform work hereinafter described which the Board has agreed to do in consideration of the actual cost incurred.

NOW THEREFORE, the parties hereto do mutually agree as follows:

1. The Board of Transportation shall perform the following work:

2. The Board of Transportation shall furnish all of the necessary personnel, labor, equipment and materials for the performance of the said work.

3. In consideration of the performance of the work, the party of the second part shall reimburse the Board of Transportation upon receipt of an invoice showing the cost incurred.

4. The estimated cost for the performance of the work is _____. Invoices submitted shall be on the basis of total cost incurred.

5. This agreement is entered into and executed by the State Highway Administrator on behalf of the Board of Transportation in accordance with the policy established by the State Highway Commission on May 2, 1973, and adopted by the Board of Transportation.

BOARD OF TRANSPORTATION

By _____

By _____
State Highway Administrator

APPROVED AS TO FORM

ROBERT MORGAN
ATTORNEY GENERAL

By _____

SAMPLE

APPLICATION FOR PERMIT TO LOCATE GARBAGE COLLECTION
CONTAINER SITE WITHIN THE RIGHTS-OF-WAY
OF STATE-MAINTAINED HIGHWAYS

LOCATION OF SITE

COUNTY_____ ROUTE NO._____

MILES ( )

EXACT DISTANCE_____FEET ( ) (N) (S) (E) (W)

OF THE INTERSECTION

OF ROUTE NO._____ TOWARD _____

CONDITIONS

The undersigned Municipality or County hereby applies to construct and maintain a garbage container site as shown on the sketch on the reverse side or attached plans on a State Highway Right-of-Way at the above location. The site will be constructed and maintained in conformance with the General Ordinance codified as Section 12.2 and adopted by the North Carolina Board of Transportation.

The undersigned Municipality or County hereby certifies that written permission of the underlying fee owner has been obtained, or if it has not been obtained, that the underlying fee owner could not be determined and located after a diligent search.

The undersigned Municipality or County certifies that written permission has been obtained from the owner of all occupied dwellings located within 500 feet of the garbage collection container site.

The Municipality or County binds and obligates itself to insure and maintain the container site in such safe and proper condition that it will not interfere with or endanger travel upon said highway, nor obstruct or interfere with the proper maintenance thereof. If at any time the Board of Transportation shall require the removal of or change in the location of the container sites, the County or Municipality binds itself, its successors and assigns, to promptly remove or alter the said site to conform to the said requirement without any cost to the Board of Transportation.

NAME OF MUNICIPALITY OR COUNTY _____

BY _____
TYPE NAME AND TITLE OF SIGNING OFFICIAL

SIGNATURE: _____ DATE: _____

PERMIT

APPLICATION FOR PERMIT APPROVED BY DISTRICT ENGINEER.

SIGNATURE: _____ DATE: _____

THIS PERMIT IS ISSUED SUBJECT TO THE FOREGOING CONDITIONS BY THE BOARD OF TRANSPORTATION.

SIGNATURE: Sally Love
STATE HIGHWAY ADMINISTRATOR

SHOW INFORMATION BELOW ON SKETCH OR ON PROPOSED PLANS

1. LOCATION OF SITE
2. DETAILS OF WORK
3. HIGHWAY FEATURES
4. HIGHWAY WIDTH
5. RIGHT-OF-WAY WIDTH
6. INDICATE NORTH

DISTRIBUTION

Applicant
District Engineer